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USSR Report

MILITARY AFFAIRS

AVIATION AND COSMONAUTICS

No 4, APRIL 1986

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15 JULY 1986

USSR REPORT
MILITARY AFFAIRS

AVIATION AND COSMONAUTICS

No. 4, April 1986

Except where indicated otherwise in the table of contents the following is a complete translation of the Russian-language monthly journal AVIATSIYA I KOSMONAVTIKA published in Moscow.

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THOUGHTS ON DEVELOPING COMPETENT COMBAT PILOTS

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 4, Apr 86 (signed to press 5 Mar 86) pp 4-5

[Article, published under the heading "For a High Degree of Combat Readiness," by Honored Military Pilot USSR Col Yu. Kuznetsov: "Ready For Combat?"]

[Text] During a tactical air exercise the subunit was instructed to redeploy to another airfield, from which aircrews would be intercepting target drones. In spite of the fact that it was IFR weather, the airmen successfully accomplished the redeployment. A particularly fine job was done by Cpts A. Bitukov and V. Lisichenok. They had put money in the performance rating bank, as they say.

The next phase in the test of the military pilots' combat proficiency was even more difficult. The "aggressor" was about to fly a massive airstrike against an important target which the fighters were protecting. A two-fighter element led by Captain Lisichenok scrambled to intercept a reconnaissance aircraft. The pilots failed to accomplish their mission, however, due to errors by the tactical control officer. On the second sortie a serious mistake was made by the pair led by Captain Bitukov. The pilots attacked the "aggressor" strike element from a very disadvantageous position. Results were most ungratifying.

Aircrews endeavored to make up for the errors on subsequent sorties. Lisichenok successfully accomplished his mission in live-firing at target drones. Although he received a mark of excellent, the proficiency level of the subunit as a whole was rated at only satisfactory. This was the overall performance result achieved by flight personnel at a tactical air exercise conducted in an environment maximally approaching actual combat.

To put it bluntly, the airmen had something to think about. Upon looking into the organization of aircrew training, officers from higher headquarters ascertained that some pilots had not indicated the combat environment on their maps, although the tactical environment was very complex. It required air defense penetration, rigid constraints on radio communications, plus a number of other complex elements which, according to the command authorities' scenario, were to make up for the actual danger of being hit by ground fire and "aggressor" fighter attacks. When the inspecting officers, however, asked

the pilots to state the ground subunits with which they would be working in teamwork, they received a vague reply: "That information is in the document."

The requisite information was indeed in the appropriate document. But the problem lay in the fact that most of the pilots had only the vaguest notion about this data. They did not know what forces were protecting the target installation or by what means the motorized riflemen were handling its defense. Thus a joint operations plan had actually been drawn up, to make it look good, but the requirements on organizing joint actions had not been communicated to the aircrews.

Naturally such disturbing errors of omission had an immediate effect on the quality of preparation for and execution of air missions. In spite of the fact that nobody committed a violation of safety procedures or made any errors in flying technique, nevertheless aircrew tactical and weapon proficiency was poor. The pilots' combat maneuvering was unoriginal and monotonous, and their attacks on the targets followed a standard scheme although, we must be frank, there was plenty of opportunity to employ unexpected, unconventional tactics. As we see, however, passivity and a habit of lacking originality took the upper hand.

A question arises: why is it that this sometimes happens? After all, the overwhelming majority of pilots, according to their superiors, are prepared for full-effort operations in adverse conditions and possess solid skills in combat flying and weapons delivery. Many combat pilots have 1st class ratings.

Let us take a look at the logbooks of Captains Bitjukov and Lisichenok, for example. It is immediately apparent that they are good pilots. Their flying technique is excellent, their bombing and gunnery are pretty fair, and they do a good job of maintaining formation. But is this sufficient in order fully to consider themselves mature combat pilots? It is appropriate at this point to quote a statement by Hero of the Soviet Union Honored Test Pilot USSR M. Gallay that air combat demands of a pilot not only confident mastery of his aircraft and that aggregate of psychological habits which are generally called daring.... In order to fight successfully, one must have a mastery of tactics and constantly invent new stratagems which take the adversary by surprise and are advantageous to oneself. Intelligence, quickness of wit and intellect prove to be no less necessary in war but even more essential than in practically any other type of human activity. More essential if only because the penalty for laziness of thinking in combat is harsher and in most instances is exacted immediately, without the slightest delay.

In connection with this we might cite as an example flight commander Maj L. Vertoprakhov. He constantly teaches his men to extract the maximum benefit from each and every training sortie. If you are on a reconnaissance mission, for example, obtain maximum information. "The 'enemy' is cunning -- you must be more cunning than he. He will hide so cleverly that you can't find him in broad daylight with a torch. This means that you must study his habits, keep your eyes peeled, spot the target and report its exact coordinates...."

I can state without exaggeration that merely good pilots feel uncomfortable in Vertoprakhov's flight. The flight commander demands that his pilots carry a maximum work load and work at a swift pace while checking everything out to the tiniest detail. He defines readiness of his men for combat as their ability first to grasp their commander's plan fully and accurately, subsequently to work through it thoroughly on the ground, and after that to rehearse it in the air, as if reading orchestra notes. The flight commander does not rule out improvisation in response to an altered situation, heavy hostile fire and electronic countermeasures.

Unfortunately this approach to things is not encountered everywhere. What is it that impedes pilots from improving their proficiency, as is required by modern combat? In my view it is first and foremost an attitude of resting on one's laurels and a lack of firmness and critical appraisal in assessing their level of proficiency. I am confident that complacency is the worst enemy in aviation personnel combat training. It impedes advance to the heights of expertise, diminishes interest in the job at hand, and engenders passivity and lack of initiative.

In some outfits they attempt to explain away lack of initiative by arguing that in aviation everything is governed by strict rules, manuals, regulations, and other documents. I am convinced that arguments of this sort are merely excuses which do a poor job of concealing the inertia of certain individuals. Flying rules and regulations by no means limit or restrict opportunities for innovative improvement. The very opportunity to fly inspires an individual and compels one to dare, to hone one's individual signature and to establish one's own identity.

As we know, there is no limit to skill, but under one mandatory condition. Persistence, desire and, I would say, total commitment are necessary in combat training. These are not merely pretty words. Total commitment in flying is a normal, natural state for everybody who truly loves the sky, who truly loves aviation.

I must frankly admit that I sometimes feel sorry for young pilots who at the age of 25 have already stopped their professional growth. Some pilots go on for years with the 3rd-class rating and do not even give any thought to boosting their proficiency rating. One cannot help but be concerned by the passivity and, perhaps, even indifference on the part of some officers. A new maneuver sequence has not been scheduled for somebody, let us say, but he is not the least concerned about the reason for this. Or one is about to fly an intimately familiar training sortie to the range, with a standard target run. In this instance one should question the fact of repetition of a training maneuver sequence and consider altering at least the tactical environment. But no, the pilot remains silent, consents, and executes the scheduled training sortie sequence. One might ask what kind of sense this makes. Perhaps merely logging the flying time is beneficial? But hours logged in this manner are no indicator of professional expertise. It is a waste of time and equipment. And it is by no means surprising that the tactical knowledge and practical combat training experience on the part of some pilots does not go beyond marks of satisfactory.

In my opinion it is also high time for us command personnel also to take a closer and more rigorous look at ourselves. Are we doing everything possible to instill in our pilots a professional pride and respect for their job? Let us take, for example, post-flight critique and analysis. In place of a detailed, kindly analysis of performance, we frequently end up imposing our own opinion on the pilots. By doing this we also in some measure hamper initiative and aggressiveness during training activities. I can anticipate the objection: "But what about experience and know-how? After all, we are teaching our men that which we ourselves have acquired over many long years of military service." A good reply to this is given by Pilot-Cosmonaut USSR twice Hero of the Soviet Union Lt Gen Avn G. Beregovoy: "Experience and know-how, real, genuine know-how, is not at all a sum total of mechanically accumulated knowledge and skills; true experience and know-how, on which one can always rely, is first and foremost that which unshackles one's brain and consciousness at a critical moment. There are no and can be no recommendations or manuals of instructions which could encompass the entire diversity and variability of actual reality."

I must comment that strident critiques and beratings, which sometimes occur during flight operations, inspire in a pilot a single desire -- to avoid critical comments at any price. In other words, the task boils down to avoiding mistakes which could bring undue attention and embarrassment during after-action critique and analysis or in totaling up performance results. If a pilot takes off on a training sortie with this in mind, one can scarcely expect any benefit to come from the mission. And it is true: who likes being called to account with and without cause, for one's own mistakes and those of others, with crude, insensitive berating? This is what causes some pilots to refrain from any initiative or innovation, preferring the calm life to being chewed out.

We should make every effort to support our men's striving toward true inquiry in training and focus them toward excellent results in performance of their job duties. People respond to trust with redoubled zeal and effort. This is why we should conduct pilot training without unnecessary situation simplification and unnecessary relaxation of demands. If we establish a tactical environment, it should be instructive, giving a pilot an idea of what can occur in an actual situation. At tactical drills and practice sessions, for example, pilots most frequently work on emergency response actions by the method of "walking it through," using the technique with much less frequency on tactical problems. And yet it is precisely complicated scenario instructions which in the dynamics of flight require precise decisions and immediate actions, expand one's intellectual breadth, and develop tactical thinking. We should constantly bear this in mind.

As we know, flight training is the most important thing for the military pilot. It takes up the lion's share of training time. In connection with this every commander should ask himself the following question: are my men prepared for actual combat? This is not a rhetorical question. The fact is that the lessons learned from performance evaluations at the range and at subunit tactical air exercises teach a great deal. But sometimes superficial conclusions are drawn from these lessons.

The development of pilots, including development in them of genuinely warrior qualities, is an important and difficult undertaking. A good air warrior is an expert pilot, a skilled tactician, and an accurate gunner and bombardier. Coordinated efforts on the part of trainees and instructors are essential in order to integrate these qualities into a single whole. Our duty as defenders of our homeland's airspace and the interests of increasing the combat readiness of aircrews and squadrons oblige us to work toward this end.

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MILITARY AIR TRANSPORT SUBUNIT COMMANDER ON CREW ESPRIT DE CORPS

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 4, Apr 86 (signed to press 5 Mar 86) pp 10-11

[Article, published under the heading "Implementing the Decisions of the the 27th CPSU Congress," by Detachment Commander Military Pilot 1st Class Maj V. Pogodin: "An Aircrew Is a Single Family"]

[Text] A military transport pilot's job is such that at times he does not know where he will be from one day to the next. There have been times when in the morning I have been in the stifling heat of the south, and in the Arctic that night. And I have flown the most diversified assignments: hauling military supplies, combat equipment, airborne assault subunits, and assisting civilians.

This winter, for example, our crew flew vehicles and equipment to Tyumen oilfield workers and military construction crews. It was not easy flying in subzero temperatures, over unfamiliar terrain lacking clearly visible landmarks and in IFR weather. I got to see my men in a new light during those difficult days. They did not become dejected at the most difficult moments, but supported one another with kind word and deed, and worked to the utmost of their energy and ability. I became convinced once again that no job is beyond the capabilities of a strong, cohesive team in which a favorable moral atmosphere and comradely relations prevail. This precisely describes our crew: strong and unified. This has been proven in a practical manner.

Recently we transported airborne troops to a drop zone. The mission involved flying to the objective area with maximum precision and dropping the paratroopers at the precise place and time. Loading proceeded quickly, without the slightest delays or mistakes. Loadmaster WO Nikolay Chernyakov, a master proficiency-rated veteran airman, closely supervised the loading process.

At last we were airborne. Completing the en route segment, we turned to our final heading. Each crew member was fully absorbed in his duties. Capt Vladimir Vernyayev, the copilot, kept his eyes glued to the instruments. Navigator Capt Gennadiy Latyshev confidently worked the navigation instruments. The other crew members were also ready and prepared for the most unexpected situation changes, for any and all scenario instructions.

The yellow light lit up in the cargo cabin. Ten to go. The cargo doors slowly opened. Now attention was fully concentrated on the instruments. It was important to respond to the readings of several instruments as an aggregate, in order to correct lateral error and correctly to hold heading, airspeed, altitude.

Zero to drop point. The command was given: "Go!" The green light lit up in response. The paratroopers stepped out of the aircraft one after the other, engaging the enemy literally as they touched down. Our An-22 headed for home. Mission accomplished. And an important role in this was played by the cohesiveness of the crew, the smooth job done by all crew members, and their excellent morale.

Back on the ground, the first thing I did was to thank the crew for a skillful, well-coordinated job. I particularly praised the performance of Captain Latyshev and Warrant Officer Chernyakov. Frankly, I was happy for them. Both work hard and conscientiously. They can handle any task. Our other crews are also a select lot: they are made up for the most part of conscientious, disciplined, hardworking airmen.

Select.... Perhaps that is the wrong word. The fact is that they became excellent airmen here, in the detachment, in the squadron, and not without active participation by all the men of our outfit, not without their indoctrinational influence. We have an immutable rule in the detachment -- an objective, frank appraisal should be made of each and every individual, action, and incident. One should not gloss over shortcomings but get together and discuss them, and devise steps to correct everything which impedes progress.

...Komsomol member Lieutenant Bulychev has not been with us long. He previously served in another subunit and earned the reputation there of being a person with a quick temper, who lacked self-control. He was guilty of breaches of discipline. Now this young officer has been assigned to a vanguard crew, where violators of discipline are not given an easy time of it. We had good reason to figure that this team would help in his indoctrination, and we were not mistaken.

Soon Bulychev got the feeling of what measure of responsibility means, what true friendship and cohesiveness are. In the past he had gotten into arguments with superiors, had reacted wrongly to criticism, and sometimes broke regulations, drinking alcohol, while now he had to give up such habits. His comrades held him strictly and firmly to account for every violation and every error of omission. The lieutenant learned, however, the meaning of joy from the awareness of a job well done, and he learned what friendly assistance and support are. He realized that one cannot achieve success in one's work without a high degree of demandingness toward oneself and respect for the collective. Today one notes an effort by this officer to reinforce his authority of rank with deeds. The primary credit for this goes to the military collective, which has correctly influenced this individual and has helped him develop solid moral underpinnings and principles.

Yes, the collective has great moral force. But in order for it to acquire this force, a suitable moral attitude must be created in the collective. And it is primarily we leader-Communists who should concern ourselves with this. And we must also begin with ourselves, as they say.

I know from my own experience that the respect a commander enjoys depends in large measure on his personal skill and ability. Once my first commander, combat veteran pilot Maj Yu. Krylov, said to me: "The crew's mistakes are your mistakes. And you should have no mistakes." I shall never forget these words, most likely because they accurately reflect a wise truism: a teacher's strength lies in his pupils.

I have a great deal of respect for those aircraft commanders who both themselves grow professionally and skillfully pass on their accumulated knowledge and experience to their subordinates. I always cite as an example leader-Communist V. Semenenko, who developed more than 20 highly-proficient pilots. The following certainly applies to him: he who not only teaches but from whom one learns is a good teacher. A commander teaches his subordinates not only flying skills. He gives them lessons of life and instills excellent moral and ethical qualities.

It is not merely the excellent flying and moral qualities of the aircraft commander alone, however, which help create a favorable moral atmosphere in the collective. It is important to utilize as fully as possible toward this end the force and influence of the party groups which are active in every aircrew. I should like to mention in this connection the work experience of aircrew party group organizer Capt G. Latyshev. He always finds time to talk with the men. As detachment navigator he assists the navigators of the other aircrews -- V. Butorin and A. Isakov. The party group organizer enjoys considerable respect. We solve many problems by relying on the party group and guiding its activities.

I remember the time when the crew was just forming. We did not yet have the unity and cohesiveness we have today. Our party group organizer stepped in and did a fine job. He not only talked about the need for comradely demandingness and mutual assistance but himself furnished an example in this regard. He knew who to advise, who to instruct, and who to keep on a tight rein. The other party members swung their support behind him. They jointly decided that no member of the crew should hold his own welfare above all other things. They enthusiastically set to work. They began more frequently holding joint training classes for the aircrew and aviation engineer service maintenance personnel who serviced the aircraft. Mutual briefings and exchange of know-how were arranged. Now aircrew and ground crew take part together in all activities. The friendship between flight and technician personnel has become stronger, and consequently there has been an improvement in the reliability and quality of readying aircraft for flight operations. Unquestionably in evidence here is strong direct and feedback linkage.

Such a linkage exists in my opinion between the moral climate within the crew and the level of indoctrination work with individual personnel. It is surely no secret that it is not a simple task to enter another person's spiritual and intellectual world, to get to know this world in a tactful manner and

skillfully to influence it. Sometimes a special degree of subtlety, tact, and sensitivity are necessary here, especially when dealing with those aspects of life which are at times hidden from us. We have a great deal of experience in this area as well.

Once the wife of an officer came to me: "My husband and I are not getting along...."

Naturally I asked what had happened. I learned that the officer was neglecting his family and had developed a great fondness for alcohol. The party organization secretary and I got together and gave some thought to the problem, and reached the conclusion that our knowledge of the men was insufficient, one-sided. Common interests on the job are fine. But what about after duty hours? Naturally everybody has his own involvements and his own day-to-day problems, but we know little about them. It was necessary to draw the proper conclusions and reorganize. As for that officer, appropriate measures were taken. The collective severely censured his behavior, and his comrades began devoting greater attention to him. I visited him at home on several occasions and chatted with him and his wife. During these visits we had a candid conversation about life's daily problems and choosing correct relationships.

This incident compelled us to reassess the results of our work. I must admit that because of the press of daily routine, one frequently lacks time to get to know and understand a person. Job-related activities are of course important. Nevertheless man is the main thing. Each individual is bound to others by hundreds of invisible threads of involvements and habit. And one must be an estute psychologist and possess pedagogic skill in order maximally to utilize all methods of influencing each individual.

When I think about this, words come to mind from the CPSU Central Committee decree entitled "On Further Improvement of Ideological and Political Indoctrination Work." They essentially state that in order to increase the effectiveness of indoctrination one should devote particular attention to thorough and comprehensive study of public opinion. Its significance is defined by the fact that it constitutes both a product of moral and ethical relations within the collective and a most important criterion for assessing the moral climate in the collective.

One can scarcely overemphasize the role of public opinion in forming healthy moral relations within an aircrew, for every airman is far from indifferent to what his comrades think about him and how his superior assesses his actions. A good name is a moral incentive which gives a boost to a person's productive energy. Concern for one's good name is also essentially concern for the good name of the entire collective. Therefore it is a matter of honor for each and every member of the crew to value the opinion of his comrades and to make an effort to support that opinion with one's deeds, actions, and attitude toward one's job.

As we know, airmen do not like bragging or a slighting attitude toward comrades. The following incident occurred in our unit. I was once training a Sr Lt K. Kukushkin to fly a transport aircraft. After several dual training

flights he stated in the presence of the entire crew that after some time he would fly better than the others. Confidence and purposefulness, reinforced by realistic capabilities, are a good thing. But in this instance the young pilot somewhat overrated his abilities. The crew members saw that he was clearly lacking knowledge and skills and that his high opinion of himself was hindering him from seeing his mistakes.

Time passed, but unfortunately this officer did not show brilliant success in his flying. At his request he was transferred to another crew. This did not improve his level of skill, however. And his comrades had formed a far from flattering opinion of him. Some time later I had to prepare an efficiency report on Kukushkin. I decided to confer with the other members of the crew and his current aircraft commander. Their opinion was unanimous: the officer had positive qualities, and they should be developed. But there were also negative qualities, which he must correct. I took his comrades' opinion into account in writing the efficiency report, and I informed Kukushkin of this fact.

We subsequently took a close look at this officer. He continued to make mistakes, and he was let down more than once by his personality and disposition. Nevertheless a change for the better occurred in Kukushkin's conduct. I am confident that a major role here was played by the collective, its unanimity and high moral and ethical criteria.

Capt K. Kukushkin is now noticeably toeing the line in his flying, and he has pledged to boost his proficiency rating.

Among aviation personnel one frequently hears the statement that a crew comprises a single family. These words contain profound meaning. This is indeed so. And, as in any healthy family, there is no place for hypocrisy, deception, and distrust. Of course the establishment of healthy moral and ethical relations in the collective is not a one-occasion process, for new people are assigned, new equipment becomes operational, and higher demands are placed on personnel combat proficiency, political training, and moral-psychological conditioning. This means that the role played by a healthy moral and ethical climate in uniting crews and increasing their combat readiness is continuously growing. This is well understood by unit aviation personnel. As regards our detachment, for several years now it has borne the title of excellent. And right now, in the year of the the 27th CPSU Congress, subunit personnel are making every effort to maintain this lofty title.

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OVERLOADING, MISUSE OF MI-8 HELICOPTER CAUSE CRASH

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[Article, published under the heading "For a High Degree of Combat Readiness," by Honored Military Pilot USSR Maj Gen Avn P. Novitskiy: "Flying According to the Rules and Regulations"]

[Text] The helicopter is a magnificent work of man. Excellent performance characteristics and modern control, flight and navigation instrumentation make it a truly versatile means of accomplishing various missions, day or night, in all weather, and under various geographic conditions. And an armed helicopter is not only a mobile means of transporting men and military gear but also a formidable weapon for destroying enemy mobile armored targets, weapon positions, well-fortified installations and concentrations of troops. In other words, armed helicopters are capable of providing effective support to ground subunits in offensive and defensive combat.

Helicopter crews perform missions of ensuring the security of our homeland in the Far North and in Central Asia, in Siberia and in the Far East. They fly over sea and desert, forest and mountains. The helicopter crewmen's job is complicated and highly specific. It requires detailed, thorough specialized training and solid moral-political, psychological and physical conditioning. Boldness and ingenuity, innovative daring and the highest sense of responsibility for successful accomplishment of the mission are integral qualities of the flying profession and a stern necessity of this profession.

A helicopter crewman's days of training routine are packed with a great many scheduled activities connected with aircraft servicing and preflighting, broadening and deepening military and specialized knowledge. These measures are directed toward improving military skills and combat readiness. Continuous increase in intensity of helicopter utilization and complexity of performed missions demand of aircrews in turn strict, unswerving observance of the rules and regulations which ensure flight safety. Unfortunately, for various reasons there still occur departures from and violations of flight rules and regulations. As a result accident-threatening situations occur, and flights do not always end safely.

The crew of an Mi-8 helicopter, for example, was on a cross-country flight. Approaching a river floodplain, the pilot executed the required maneuver to make a landing approach onto an area of limited size. Just as it initiated hover, the craft suddenly swung spontaneously left, and the tail rotor blades struck some trees. The helicopter plunged into the river. The crew members and passengers on board were able to extricate themselves from the helicopter. Fortunately everybody came out of it unscathed.

Unquestionably the guilty party in this incident was the aircraft commander (incidentally a military pilot 1st class), who made an aircraft handling error. It would seem to be a clear-cut situation: disciplinary action should be applied to him, while a detailed analysis and critique of the incident should be held with the entire crew, as is the practice in aviation, with appropriate classes to increase knowledge of aerodynamics and helicopter flying technique.

The following question inevitably arose in the course of the inquiry, however: how could it happen that a 1st-class pilot who had logged a great many hours on a helicopter of this type, who had made hundreds of landings into unfamiliar landing sites, including of limited size, had made such an error, which practically cost the lives of the crew and passengers?

It was ascertained that the pilot, on orders by the combined-arms officer at whose disposal the helicopter had been placed, had altered the route of flight specified by the higher-echelon command post and at a certain landing site had taken on additional cargo, without determining its weight, as well as passengers -- military personnel on a hunting junket, who were to be delivered to the site of the hunt. As he attempted to land with a tailwind onto an unfamiliar, unmarked landing site on taiga-covered mountainous terrain with an overloaded helicopter, the pilot was unable to handle the landing and crashed.

What should we call the pilot's actions in this instance? Did it amount to irresponsibility or negligence bordering on criminal negligence, an attitude of immunity to normal rules and regulations, or reckless derring-do? Or was it perhaps a conceited attitude and inflated overestimation of his ability? Or was it incompetence?

As we know, flying and flight safety are governed by appropriate legislative enactments. For example, the rules and regulations governing flight over the territory of the USSR, the authorities and obligations of crew members and passengers are spelled out in detail in the USSR Air Code, ratified by ukase of the Presidium of the USSR Supreme Soviet, in orders issued by the USSR Minister of Defense, as well as in USSR Armed Forces aviation flight operations documents, entering into force by orders of the Commander in Chief of the Air Force.

Frequently combined-arms officers at whose disposal helicopters are placed attempt to make use of them which involves violations of regulations, due to ignorance of the documents which govern flight operations. But it is 100 times worse when this is done by air commanders, who sometimes fail to consider the legal consequences of their acts. In the incident under discussion there were violations of the requirements of the military oath of

allegiance and the military regulations pertaining to strict, precise observance of rules and regulations by all military personnel. The combined-arms officer and the helicopter pilot failed to heed regulations which are binding on all Ground Forces and Air-Force personnel, and by so doing they were in fact countermanding an order by the Commander in Chief of the Air Force and USSR deputy minister of defense, who is their direct superior.

Practical experience indicates that this happens wherever indoctrination work with officers is neglected, particularly with command personnel, where a strong sense of personal responsibility for the safe outcome of a flight is not instilled in flight personnel, and when such qualities as honesty and truthfulness, which characterize the organic integrity of the character and person of the airmen, are reduced to zero. This is particularly noticeable in those subunits where rigorous oversight is lacking, where in-air violations of rules and regulations are determined only with the aid of thorough analysis of flight recorder tapes. It is not mere happenstance that Mi-8 general utility helicopters are frequently used as taxis precisely in such subunits.

One must be profoundly aware of the fact that a helicopter is not a car. A physically and mentally fit individual undergoes specialized ground and flight training, involving years of intensive study, just to master the ability to fly a helicopter in normal, VFR conditions. A pilot is first and foremost a highly-educated, mentally active military pilot, and should not be reduced to the level of a rank-and-file ground-vehicle chauffeur. One would also do well to bear in mind that the per-hour cost to the state of flying a helicopter is hundreds of rubles. In failing to carry out or illegally altering the mission, however, for some reason certain command personnel at times ignore this financial aspect of the matter, recalling it only when something unpleasant occurs. And yet it is a matter of our ethics and a conscientious attitude toward public property, to preserve and multiply which is a matter of honor for each and every Soviet citizen. Our party focuses us toward this.

Violations of flight regulations, regardless of who is guilty, do serious harm to combat readiness and flight safety. Some senior aviation commanders, counting on their own high degree of professional competence, at times arbitrarily alter flight plans and are guilty of violations of operating restrictions. As a rule aircrews are aware of this. Combined-arms commanders, who are witness to and frequently direct participants in such violations of regulations, begin to get the notion that helicopters have unlimited capabilities. This is one of the reasons why they sometimes issue unwarranted orders to pilots.

Many violations occur due to the disinclination on the part of some air commanders to "spoil relations" with the command element of the combined-arms units and large units in the interests of which helicopter subunits are operating. Weak in knowledge of their authority and obligations in the organizational structure, air commanders sometimes dance to the tune of the combined-arms commanders, as they say. The latter in turn, witnessing examples of the "activities" of unprincipled air commanders, make unlawful demands on helicopter crews, attempting to pressure them with their office and authority. In this situation some pilots, not wishing to be viewed as incapable and failing to recognize the limits of their ability, proceed to

carry out assignments which are too much for them. Gross mishap-threatening errors occur as a result.

The law stands guard over flight safety, and nobody is empowered to break the law. Every pilot should know and observe the law. Pursuant to Article 25 of the USSR Air Code, for example, a pilot in command is empowered to give orders, within the limits of his legal competence, to any person on board the aircraft, which shall be unconditionally obeyed. This authority is confirmed by the provisions of Article 94 of the regulation, which states that persons on board a helicopter as passengers, including those at whose disposal the helicopter has been placed, are prohibited from interfering with the activities of the crew and requiring that the crew alter the approved flight plan and procedure of execution.

As we know, a flight plan can be altered only by that person in authority who has signed said flight plan or a higher-echelon authority, coordinating the new flight plan in advance with the appropriate air traffic control authority. Otherwise an aircraft is absolutely prohibited from taking off.

Helicopter pilot Capt M. Kotlov once found himself in a situation similar to the one described above. During a flight he was ordered to alter flight configuration and route. Acting pursuant to documents governing flight safety, he refused to carry out the unlawful order, for which he was sent back to his unit. When the pilot arrived back at his home field, the unit commander failed to investigate the incident and punished the pilot. It is unnecessary to stress that the unfair decisions and actions of superiors wound one's pride and do great moral damage to the very underpinnings of our military aviation, undermining the foundation of moral and ethical behavior. We must give due credit to the pilot: he responded correctly to the situation, remained honorable and principled, and continued to observe rules and regulations in his subsequent military service. Lt Col M. Kotlov currently commands a large Air-Force outfit and, as commander and indoctrinator, requires that his men unswervingly observe all rules and regulations governing flight safety.

It is an important duty of commanders at all echelons constantly to remind and clearly to explain to the members of aircrews that they bear criminal liability as well for violations of rules and regulations pertaining to flight operations and preparation for flight operations. For example, criminal acts pertaining to flight operations bear penalties from 3 to 10 years in prison. One should be clearly aware that the responsibility for violation of flight rules and regulations is borne only by those persons who are direct members of aircrews, as well as persons in authority taking part in air traffic control. Every pilot, navigator, and other crew member should bear in mind Nikolay Yegorovich Zhukovskiy's precept: "The airplane is a great creation of man's hands and intellect. It submits to no authorities other than persons who

respect and rigorously observe the laws of flight." They must not only bear this in mind but also rigorously put it into practice, for the great significance of safety as well as a high degree of moral fortitude, genuine professionalism and combat proficiency is incorporated in it.

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TRAINING FLIGHT TECHNICIANS TO HANDLE IN-FLIGHT EMERGENCIES

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 4, Apr 86 (signed to press 5 Mar 86) p 28

[Article, published under the heading "Constant Attention to Flight Safety," by Sr Lt V. Mayorov, crew chief of an excellent-rated aircraft: "Problem Corrected in the Air...."]

[Text] The military transport aircraft was flying in the pattern. Suddenly the rudder jammed. The situation was critical. It required of the crew decisive, flawless actions. The aircraft's senior flight technician [crew chief] did an excellent job in a tense situation. Displaying excellent professional qualities, he instantly made his way to the rudder locking mechanism and quickly corrected the problem. The flight was safely completed.

This incident happened a long time ago, and I bring it up only in order to emphasize that important elements in the work of the aviation specialist include not only his professional skill but also a high degree of psychological preparedness for an in-flight emergency and actions in response to emergency situations which have been honed to automatism.

Practical flying experience indicates that the necessary skills for correcting problems in emergency situations are developed in flying personnel and airborne technical personnel as they acquire work experience. One cannot, however, count on the spontaneous development of these skills. It is essential to work purposefully both on the ground and in the air, developing in aviation personnel the readiness for precise performance of job duties in emergency situations. And this applies not only to flight personnel but also to aviation engineer service specialist personnel.

Serious attention is devoted to this problem in the vanguard Air-Force outfit in which officer A. Solenkov serves. They constantly work to improve the proficiency of flight technicians, to form excellent moral-fighting qualities in these personnel, and to accomplish their psychological and physical conditioning. Special classes and training drills are held for officers and warrant officers for this purpose. Their progress in increasing skills and improving readiness to carry out their job duties with precision and efficiency in a complex situation is rigorously monitored.

Flight technicians go through a thorough process of training prior to being allowed to work unsupervised. Specialist personnel certified for flight operations as a rule have logged considerable aircraft servicing and maintenance time. This is due to the fact that the requirements regarding job proficiency and authorization to work unsupervised are considerably higher on flight technicians than efficiency requirements placed on aviation engineer service ground maintenance specialists. As aircrew members they frequently have occasion to work away from the base at which they are stationed, where they must rely solely on themselves: on their knowledge of theory and their own skills in aircraft servicing and repair.

Flight technician instructors play a special role in training this category of specialist personnel. They determine in large measure the development of young airmen, growth in their job proficiency, and their ability knowledgeably to analyze and promptly to prevent the causes of potential malfunctions. Capt S. Furtov -- a maintenance specialist with many years of service -- is considered one of the top instructors in the subunit. He conscientiously teaches his charges, helps them gain confidence in their ability, and develops in them preparedness to act in difficult situations.

Sergey Ivanovich devotes considerable time to analysis of errors made by flight technicians when servicing equipment during operation. Preventive maintenance is very important here. In the course of practice drills Captain Furtov directs his charges' attention to the procedure and sequence of performing servicing operations and creates an atmosphere of heightened emotional stress, which is the main difference between an emergency situation and normal flight conditions. For example, he regularly has his flight technicians, working under difficult conditions, quickly take engine instrument readings and plan -- and rearrange if necessary -- the sequence of performance of operations in a given emergency situation.

Experience indicates that it is difficult to achieve precision work performance during flight without strong psychological conditioning of airmen. It is for good reason that Captain Furtov is constantly reminding his flight technicians: "Get both the aircraft and yourself ready for a flight."

When scheduling a check flight with a flight technician, Sergey Ivanovich thoroughly tests his proficiency level on the ground. He also regularly uses a group testing method, for example, on a day of preliminary preparations for flight operations, he always tests the knowledge of specialist personnel and their preparedness to perform their job in the air. This enables Captain Furtov to focus greater attention on the most important elements involved in training officers and warrant officers and to keep an eye on all specialist personnel. As a result his flight technicians began making fewer mistakes and doing a better job of readying aircraft for flight operations. And if they encounter a difficult situation aloft, the airmen perform knowledgeably and with composure.

...The aircraft was returning to its base at night. Its arrival was unscheduled. The aircraft would be landing on an unlit runway. During the landing approach, however, the aircraft's landing lights failed to work. Flight technician in charge of aircraft and airborne equipment Sr Lt V.

Mikhaylov quickly opened the fuse panel and replaced fuses. The pilot did not have to abort the approach. He made a successful landing.

Of course correction of in-flight problems is not the normal situation. But the flight technician must be alert at all times. To be alert, he must monitor the operation of systems and equipment, notice even insignificant deviations from normal and prevent equipment failures and malfunctions. If such deviations occur, the flight technician should report this fact immediately to the pilot and take vigorous steps to correct them.

The flight technician's job is a responsible and difficult one. His level of proficiency, solid skills, and his ability to act with precision in emergency situations determine in large measure the aircrew's successful accomplishment of assigned missions as well as flight safety. And as the experience of leading military aviation collectives indicates, work to develop these qualities must be purposeful, effective, and constant.

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SQUADRON ENGINEER CRITICAL ELEMENT IN TRANSITION TO FOURTH-GENERATION COMBAT AIRCRAFT

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[Article by Maj Gen Avn G. Matveyev, chief, Aircraft Maintenance Directorate and deputy chief engineer of the Air Force: "An Engineer's Duty Makes It Incumbent (Summarizing Discussion of A. Grishin's Article 'The Squadron Engineer. What Should He Be?')"]

[Text] For more than a year the journal AVIATSIYA I KOSMONAVTIKA ran a discussion of an article by Maj Gen Avn A. Grishin, deputy commander of the Air Force for aviation engineer service and chief air forces engineer of the Red-Banner Odessa Military District, entitled "The Squadron Engineer. What Should He Be?"

There is good reason for interest in this question on the part of Air-Force engineers. It is aroused by the fact that in present-day conditions, when personnel are more and more frequently performing combat training tasks without outside assistance, the role of the squadron deputy commander for aviation engineer service has increased considerably, for he now functions not only as a supervisor -- the immediate organizer of work on aircraft -- but also as a leader-Communist, responsible for training and indoctrination of the subunit's aircraft maintenance personnel, for their professional improvement, off-duty routine, intelligent use of leisure time, as well as for technical training of flight personnel and the airmen's ability knowledgeably to maintain modern aircraft and weapons.

I should like to take this opportunity to thank all those who took part in this most relevant, useful discussion. It will unquestionably help improve work in the units with squadron deputy commanders for aviation engineer service and will enhance their role in knowledgeable aircraft operation and maintenance and full utilization of an aircraft's combat capabilities in performance of complex, important missions.

At the present stage of development of the Soviet Air Force, success is determined to a decisive degree by the human factor. The party, stresses the Party Program, approved and ratified by the the 27th CPSU Congress, will continue in the future concerning itself with an all-out increase in respect

for honest, highly-productive labor, development of initiative and innovativeness, and mastery of a Leninist work style by our cadres.

Air-Force units and subunits have trained and indoctrinated a great many highly-skilled squadron deputy commanders for aviation engineer service, genuine experts at their job, skilled masters of training and indoctrination, and genuine organizers of competition for knowledgeable operation and maintenance of modern aircraft systems as well as incorporation of all new and advanced elements into the activities of aviation engineer service personnel. The work style of many of them is distinguished by thorough knowledge of their job, the ability to penetrate to the heart of phenomena, precisely to organize the training and work duties of specialist personnel subordinate to them, and objectively to assess their military labor.

Vanguard squadron aviation engineer service supervisors instill in subordinate officers an attitude of intolerance toward shortcomings, a striving to increase day by day the successes achieved in combat and political training, strictly to observe the requirements of military discipline, the schedule of daily routine, and to seek adoption of a sober way of life in the military. Such aviation engineer service supervisors are genuine assistants to commanding officers in unifying the outfit and creating in it an atmosphere of innovative search and smooth, harmonious work activities.

The experience of vanguard squadron deputy commanders for aviation engineer service is one of our priceless resources. Thorough study, synthesis and practical adoption of this know-how into aviation engineer service activities should become one of the foundation stones of the work style of Air-Force engineer supervisor cadres.

Practical experience has shown that without constant self-monitoring, thoughtful self-analysis and a critical attitude toward one's job-related activities, without creative initiative and a new approach to things, today's squadron deputy commander for aviation engineer service cannot count on developing into a mature, experienced and promising aviation engineer service supervisor.

Unfortunately some officers show little concern for broadening their ideological-theoretical horizons, increasing their professional expertise, improving their work style, and bringing it into conformity with the demands of the times. An uncritical attitude toward their work methods and results, smugness and complacency result in shortcomings in the activities of such squadron aviation engineer service supervisors becoming deeply rooted, negatively affecting practical activities, and leading to mistakes and breaches of regulations in readying aircraft for flight operations and in the course of flight operations shifts.

It is not surprising that many of the contributed articles reveal in detail the process of development of the squadron deputy commander for aviation engineer service and formulate the demands made of him in connection with the fact that fourth-generation hardware is becoming operational in aviation units and subunits. Almost all airmen quite correctly assign paramount significance to such important components of successful activities on the part of the

aviation engineer as the level of his scientific and technical proficiency, his strength of party conviction, his Marxist-Leninist conditioning, and his ability to isolate the main element in his organizational work.

Maj Gen Avn A. Shelekh is right (see article "Engineer on the Airfield," AVIATSIYA I KOSMONAVTIKA, No 2, 1985) in stating that the aviation engineer's principal workplace is at the airfield. Here an officer has at his disposal inexhaustible capabilities for his men's training and indoctrination, for increasing their job-related knowledge, and for extensively developing his abilities as an organizer and supervisor of an entire aggregate of complex jobs connected with maintaining modern fixed-wing and rotary-wing aircraft. Who but an engineer knows better than all others an aircraft's design and construction, its armament, control, performance, and navigation instruments, automated control systems, powerplant, and the requirements of the documents which contain the rules and procedures of operation and maintenance of a given type of aircraft? Today one can scarcely exaggerate the engineer's role and his creative potential in organizing oversight over the quality of performance of all work operations on aircraft equipment and monitoring of observance of work-process discipline and follow-through by aviation engineer service personnel.

Day after day practical experience convinces us that increasing return on engineer labor is a demand of the times, an important indicator of an engineer's efficient performance in accomplishing the difficult and important tasks assigned to aviation engineer service personnel in connection with mastering third- and fourth-generation aircraft, as well as the new processes which are taking place in development of our Air Force. Combat readiness and flight safety, as well as the effectiveness of combat employment of aircraft depend in large measure on the squadron and regiment aviation engineer service supervisor.

Today as never before the prestige of the Air-Force engineer is determined by his creative potential, his ability not only himself to master new aircraft which have entered service with the Air Force but also to help flight and technical personnel do so as well. Success here depends in large measure on moral-psychological attitude, persistence and purposefulness, and profound awareness of one's personal responsibility for maintaining combat readiness at a high level in light of the demands of the the 27th CPSU Congress, orders and directives of the USSR Minister of Defense and the commander in chief of the Air Force.

The author of the article "Engineer on the Airfield" was quite correct in addressing problems pertaining to job-related training of squadron deputy commanders for aviation engineer service by such a senior echelon as specialization-area regimental engineers and unit deputy commanders for aviation engineer service, for it is no secret that in conditions of present-day combat an aviation squadron may operate autonomously, and independent decision-making on matters of aircraft maintenance will be required of the organizer of aviation engineer service. Very important here are such qualities as speed and flexibility of thinking, as well as the ability to foresee the possible development of events.

An article by Lt Col A. Fedurin, an instructor at the Air Force Academy imeni N. Ye. Zhukovskiy, entitled "Party-Mindedness of an Aviation Engineer" (AVIATSIYA I KOSMONAVTIKA, No 9, 1985) profoundly and persuasively validates the need for his mandatory participation in party and volunteer work. Practical experience indicates that by means of this the engineer creates a foundation for improving his personal political, professional, and moral-psychological qualities. And this, as we know, forms the basis for improving political indoctrination work with subunit personnel. There is also another important thing. As a Communist, the squadron aviation engineer service supervisor must train and indoctrinate subordinates in the process of military labor, aircraft maintenance, in the course of intensive combat training. We feel that the wealth of experience from the Great Patriotic War should be more aggressively utilized in this.

In my opinion Lt Col V. Basok expressed a valid idea in his article "Methods Specialist and Indoctrinator" (AVIATSIYA I KOSMONAVTIKA, No 6, 1985): today's squadron aviation engineer service supervisor should be not simply an engineer, involving his relationship to the aircraft, but also an "engineer of men's souls," since operation and maintenance of modern aircraft is inconceivable today without developing in personnel the highest degree of professional and moral-psychological qualities, and a feeling of personal responsibility for each and every technical procedure performed on an aircraft.

One's attention is drawn by an article by regimental deputy commander for aviation engineer service Lt Col V. Paliy entitled "Competence of the Engineer" (AVIATSIYA I KOSMONAVTIKA, No 11, 1985). The author raised a number of important questions, and in particular discussed in detail such an effective form of aviation engineer service specialist personnel job training as technical critique and analysis sessions, for it is at such sessions that one should study advanced know-how in aircraft operation and maintenance and analyze the extent to which personnel are observing the requirements of documents governing accident-free flight operations, as well as examination of matters pertaining to observing plan and process discipline and follow-through when working on a fixed-wing or rotary-wing aircraft. Methods of indoctrinating discipline in personnel are regularly discussed at meetings of the engineering-technical section of the unit methods council.

Practical experience in organizing combat training with aviation personnel provides a great many instructive examples of how comprehensively-trained squadron aviation engineer service supervisors possessing a heightened feeling of responsibility, in the interest of increasing the combat readiness of the subunits and successful accomplishment of assigned missions by aircrews, persistently seek ways to improve engineering and technical support of flight operations. And this is absolutely correct. Without an innovative approach, profound thinking, and initiative on the part of the aviation personnel, it is impossible to achieve good results in accomplishing combat and political training tasks, in reasonable and economical utilization of financial and material-technical resources.

Unfortunately matters pertaining to economic activities of the squadron deputy commander for aviation engineer service and efficient expenditure of training

time in the interests of boosting the level of professional expertise and technical knowledgeability of aviation engineer service specialist personnel were not adequately addressed in the course of the discussion. Therefore it is clearly necessary to return to these topics. There is no need to state how important they are. We all know what attention they received in the CPSU Central Committee Political Report to the the 27th CPSU Congress, in the CPSU Program and in other congress documents.

Officer V. Paliy's unit devotes considerable attention to developing in the squadron aviation engineer service supervisors skills in conduct of thorough engineering analysis of malfunctions and failures which occur in the process of aircraft operation and uses specific examples from practical experience to teach the squadron-echelon engineers to think in an up-to-date manner and to inject into squadron aviation engineer service activities a spirit of newness and an innovative attitude toward one's job, to approach everything from a scientific point of view and to rely more extensively on new advances. Without this it is impossible today for the squadron deputy commander to make his work be in conformity with the behest of the times and support the airmen's multifaceted training process with a high coefficient of reliability.

Constant attention to the problems encountered by subunit aviation engineer service supervisors enables the unit engineers to determine promptly and accurately who needs what specific assistance and to specify further ways to improve the job and methods skills of the squadron deputy commanders for aviation engineer service and, if necessary, to make corrections and adjustments in working with this category of specialist-supervisor personnel.

Vital problems of equipment operation, maintenance and combat readiness, flight operations safety, and ways to increase the job proficiency and psychological conditioning of aviation engineer service personnel are frequently discussed at monthly critique and analysis sessions with active utilization of data recorder tapes, which have become an effective means of officer and warrant officer training. This develops the organizer abilities of specialist personnel, initiative, and develops a high degree of technical knowledgeability. As a rule the regimental engineers or squadron deputy commanders for aviation engineer service speak at these meetings. And the author of the article "Competence of the Engineer" is correct when he states that wherever an engineer does not limit himself merely to his job duties but, utilizing specialized, education-science and methods knowledge, he innovatively helps the military collective maintain a high level of combat readiness, aviation personnel develop broader technical knowledgeability, and mastery of modern aircraft proceeds faster and with less expenditure of energy and resources.

Such an approach to things of course forces the squadron engineer to work continuously on self-improvement, to gain a new understanding of what scientific and technological advance brings to aviation, and to approach planning and scheduling of his work in a thoughtful manner, for planning and scheduling one's work time in a correct and scientific manner and determining the main component are perhaps those decisive elements which will help the squadron aviation engineer service supervisor to find his place in the welter

of diversified activities and to come out of the most difficult situations with flying colors.

There are moments when the subunit deputy commander for aviation engineer service has no time to spare. In addition to matters connected with equipment maintenance, he must work on preparing various technical documents, prepare for holding training classes and drills, and concern himself with renovating and upgrading training facilities, which today are available in almost every squadron, plus a great many other items.

Here too it is very important to find the correct way to accomplish tasks on the agenda together with the flight technical maintenance unit chiefs and maintenance group chiefs.

The question of improving the quality of engineering and technical training was quite correctly raised in the course of the discussion, training which helps continuously increase knowledge of theory and improve the skills of aviation engineer service personnel in aircraft maintenance and repairs. Meriting attention in this connection are training conferences for regimental deputy commanders for aviation engineer service and technical maintenance unit chiefs at which bombsight, weapons sight, flying and navigation instrumentation systems are studied. These activities have proven quite effective. I feel that such training conferences should also be held at the aviation unit facilities level for squadron deputy commanders for aviation engineer service. One of the principal forms of such training could be independent study with mandatory monitoring and oversight by the specialization-area regimental engineers.

Today we simply cannot tolerate skipping engineering and technical training classes, as has occurred in the past in some subunits. Practical experience unequivocally attests to the fact that if an aviation engineer service specialist has missed such classes, this must be considered a gap in his training, a source of deficiencies and errors of omission in aircraft maintenance.

Also meriting serious attention is the suggestion made by discussion participants to introduce a "Maintenance Specialist's Log," which would determine a given airman's preparedness to perform various maintenance procedures on a fixed-wing or rotary-wing aircraft. Such a document would be very helpful to squadron deputy commanders for aviation engineer service in training and indoctrinating airman personnel.

Unfortunately such a serious problem as the technical knowledgeability of aviation engineer service specialist personnel in general and of the squadron deputy commander for aviation engineer service in particular was not adequately addressed in the course of the discussion. The term technical knowledgeability is constantly acquiring new content, greater meaning and significance. Qualitative changes in the design and construction of aircraft and armament are determining elements here.

The fact is that the modern aircraft is checked and preflighted in a strictly-determined sequence, according to maintenance procedures checklists and

schedules, utilizing sophisticated test equipment. This in turn places great responsibility on the shoulders of subunit and unit aviation engineer service supervisors for all-out strengthening of labor and, naturally, work-process discipline in assigned areas. A high level of technical competence is incompatible with slackness, irresponsibility, and breaches of standards of military ethics. Precisely for this reason aviation engineers, particularly young personnel, must work harder to master the art of ideological and moral indoctrination of subordinates. Painstaking indoctrination work with individuals, taking into account the character, personality, abilities and proclivities of each aviation engineer service specialist is absolutely essential here.

In other words, the level of technical sophistication is a derivative from the ideological and professional maturity of a given aircraft maintenance specialist and is expressed in the end results of his labor. A high degree of overall knowledgeability on the part of the aviation engineer, including level of technical sophistication, should become an inner need, an indicator of his self-expression as an individual. This is fully in conformity with the interests of the military collective and our socialist society as a whole.

Just as any important undertaking, development of a high level of technical knowledgeability in aviation engineer service supervisors cannot come spontaneously, without orderly, purposeful organizational and political indoctrination work on the part of commanding officers, staffs, party and Komsomol organizations. It is therefore very important not to make this into a short-lived drive or campaign, but to conduct it continuously, making every effort to publicize achieved results and to note, synthesize and disseminate the know-how and experience of vanguard performers in a prompt and timely manner. Then we shall totally eliminate instances of still-occurring breaches of work-process discipline in preflight-readying of aircraft.

Summarizing the above, I should like to note the timeliness and importance of the meaningful discussion conducted on the pages of this journal on the role and place of today's squadron aviation engineer service supervisor and on such moral-psychological and professional qualities as firm ideological conviction, excellent organizer abilities, thorough knowledge of the equipment and of his men, and the ability to think and work independently, with creative initiative. In light of the demands of the the 27th CPSU Congress, the constructive position of today's squadron engineer, on whom the combat readiness of aircrews and subunit as well as flight safety depend in large measure, is precisely this.

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TRANSBAIKAL AIR-FORCE GARRISON PERSONNEL SUBJECTED TO SUBSTANDARD LIVING CONDITIONS

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[Article, published under the heading "Quality of Life and Combat Readiness," by Maj A. Zhilin, AVIATSIYA I KOSMONAVTIKA special correspondent: "Full Face and Profile...."]

[Text] The Transbaikal is a harsh and majestic region. In winter the mercury rarely climbs above 35 degrees below zero. But snow does not last long on the ground: it turns into ice and is scooped away by piercing winds. The naked land literally cracks and snaps from the bitter cold. The sparse, ground-hugging trees shatter like glass in the bitter cold, scattering tiny chips in all directions. The minute one goes outdoors, the frosty air seems to cling to one's face, burning the skin, penetrating into the lungs, numbing and stiffening the entire body.

The aviation garrison at which Lt Col A. Makeyev is stationed lives and works in these conditions. From the vantage point of a helicopter it looks like a tiny little community surrounded by large and small coniform hills, lost among the boundless expanses of the Transbaikal. Duty is not easy here, but people do not complain. Most of the people at the garrison are strong, conscientious individuals. Military personnel and the members of their families realize that they must go where the nation's interests require, where one's hands, experience, skill and knowledge are needed. A strong sense of duty helps the airmen and their families staunchly endure the difficulties of duty in this region.

Life at the garrison goes on as usual. The military post, in spite of a temperature of almost 40 below, is filled with children's voices, and from time to time the noisy sound of helicopter rotor blades can be heard over at the airfield: the airmen are working on improving their combat proficiency.

Flight operations also have their peculiarities in these conditions. The terrain is practically featureless. Once airborne, one's gaze is treated to an endless sweep of taiga-covered coniform hills, looking like giant ocean waves. Special experience and know-how are required in order precisely to

maintain one's bearings in such conditions. And if a forced landing should occur, one must count primarily on one's own resources and knowledge.

Aviation personnel have become accustomed to these so-called objective difficulties and remain aware of them in the course of combat training. They are constantly seeking new ways and methods of overcoming them. Thanks to a profound grasp of their objectives and tasks, the men are constantly improving their level of professional skill and strengthening combat readiness.

But there are also difficulties of another kind as well at this garrison, so to speak subjective difficulties which, to put it bluntly, are not only difficult but impossible to accept, since they are engendered by an irresponsible attitude on the part of certain personnel toward their job.

As we know, when a person is in a good mood it is much easier to perform his duties and do his job, even in the most difficult conditions. Does this require a great deal? It is necessary to have a roof over one's head, with things bright and warm under that roof. As regards comfort, this is a highly personal matter. Everything depends on the desire and imagination of the tenants. But the fact is that warmth, that basic and essential warmth which comes from steam-heat radiators, is lacking at the garrison. Technically one cannot say that there is no heat at all, because the temperature is in fact 10 degrees Celsius in the officers' quarters. But the central heating is not working at all in the enlisted barracks. It is necessary to make use of the notorious "burzhuyka" space-heater stove, an item one is quite frankly even embarrassed to mention in the age of electricity. The radiators in the offices in the headquarters building are kept just warm enough to keep the water in them from freezing. One is grateful for the fur flying gear: it protects one at least to some extent from the ubiquitous cold.

There are no warming facilities at the airfield; there is nowhere to take refuge from the cold, except perhaps to climb into the cab of a service vehicle for a few minutes. Hot meals are a most welcome thing during flight operations. The doctors claim that hot food restores energy. But for how long? And aviation personnel have one sole hope -- to get warm at home following an intensive working day. Upon returning to their quarters, they often unfortunately find the following situation: radiators cold or frozen, no water, and no electricity either.

But most families have small children. What about them? It is precisely parental compassion which compels flight and ground personnel to grab a blowtorch and, instead of enjoying deserved rest, go into the basement and "rescue" the frozen heating system or go perform repairs on the post's worthless power transformer. But they must be back on duty early next morning. This goes on almost all winter.

A question naturally arises: should somebody bear responsibility for this abnormal situation? Let us state right at the outset that the garrison in question has by no means been forgotten by the higher command level. The post is regularly visited by Maj Gen G. Onishchenko, deputy commander of the Transbaikal Military District, Col Ya. Titov, deputy commander of district air forces, and many other ranking officials. And every one of them without

exception is compelled to inspect that job performance of... military construction personnel. One officer is responsible for the bachelor officer quarters, another is responsible for the alert section shack, and still another for the enlisted mess. Otherwise, without pressure applied from above, the construction personnel are incapable of performing their duties and completing the above-mentioned facilities on schedule. One might ask where one finds an inspecting general or colonel for every construction directorate chief. Just what are the construction personnel capable of accomplishing?

As paradoxical as it may be, it is a fact that the situation at this military post is such that aviation personnel are in a state of direct dependence on military construction organizations. If they can complete a construction job on schedule, fine, and if they cannot -- slip them a bill or two. And no person in authority can do anything about it. And so an Air-Force commander must go to the construction section chiefs like a mendicant, with hat in hand, begging them to finish construction a little faster on a facility which is of vital importance to the unit.

It was noted at the Armed Forces Conference on Improving Living Conditions in the Military that off-duty routine is not merely a domain of housekeeping activity but rather a political concept. To make every effort to improve living and working conditions for military personnel means to implement the party's social policy calling for a steady improvement in working people's standard of living and quality of life. The mood in which an officer or warrant officer comes on duty determines how well he will command his men and perform his duties. To have no concern for people's living conditions is at the very least wasteful and uneconomical in regard to the quality of their military labor. In the case under discussion, provision of proper living conditions to the aviation personnel is first and foremost concern about those persons on whom combat readiness depends in full measure.

Are the people in the construction organization to which officers I. Zavolodko, A. Kez, and A. Trishkin are assigned cognizant of these demands? Yes, they are. By all indications, however, they are in no hurry or have no desire to take them as a guide to action. "We do our job the best we can" -- one hears this shopworn phrase from military construction personnel at practically every construction site.

Indeed, at construction sites one can see arc-welding flashes and hear the sound of axes and cement mixer. Viewed in profile, so to speak, it seems that work is in progress.

But let us try a face-on look, as they say. We see that the countenance of the construction job contains major flaws. Work quality and pace fail to meet any requirements whatsoever.

For example, at the end of last year a new aircrew and ground personnel mess, which had been under construction almost two times as long as scheduled, went into operation in place of the old facility, although start-up did not run entirely smoothly. One might assume that the interior finish and appointments would be magnificent with construction in progress so long. Let us take a look inside. The building is brand-new, but the walls are shabby and full of

cracks. The kitchen lacks basins for washing meat, lacks essential equipment, and there are a great many leaks in the plumbing. In short, it looks like it is time to close the mess hall down for major repairs.

"When we ask the construction people to correct the problems," reports mess-hall manager Soviet Army civilian employee L. Damirova, "we keep getting the same answer: 'These are trifles -- you'll manage.' Since 14 November we have been trying to correct these 'trifles' with our own manpower and resources. To date, with the assistance of Air-Force efficiency innovators and handymen, we have managed to correct only about half the problems."

The new alert section shack is an important, priority project, since the old one fails to meet today's requirements. It was supposed to be completed last April. The construction people "tried" to finish on schedule, and they most probably would have, but a misfortune occurred -- during a preliminary inspection of the building an interior wall collapsed and the heating system froze.

Just what did the construction people hope to accomplish, attempting to foist off obviously shoddy work? It seems that they were counting on psychological effect. The aviation personnel had nowhere else to go. Even in severe climatic conditions they would be forced to accept a completed job with all its defects.... One cannot fathom the position taken by certain persons in authority who prefer to dictate their own terms instead of taking the necessary measures against the less than conscientious workers. Apparently it is advantageous to some people to put a quick check mark on the plan document, indicating completion of another item. It is a pity that these officials fail to consider what this actually costs.

Construction directorate chief Major Malyshev was responsible for building the above-mentioned facilities. But at the present time it would be rather difficult to call him to account for the errors of omission, since he has been transferred elsewhere. Lt I. Zavolodko has been thrown into the "gap" in his place. Now everything for which his predecessor is to blame is being dumped on his shoulders. But the fact is that it is not easy for the young officer to extricate himself from his predicament, particularly without adequate support by his superiors.

The situation is bad with the enlisted mess. According to the schedule, the building was to be turned over to the client last December. As of right now one finds at the building site an uncompleted foundation and, as if intended as a joke, a poster with the message "Soldier! Higher labor productivity and better work quality!" Unfortunately it is not so funny as it is sad.

The documents of the Armed Forces Conference on Improving Living Conditions in the Military state right out that concern for living conditions is also concern for combat readiness and the ability to function in an actual combat situation. Seeing how little the construction workers are accomplishing, aircraft mechanics, maintenance specialists, and even flight technicians frequently work on the construction job, although the primary place for these personnel is the airfield, where combat readiness is forged out. In view of the circumstances, however, they must perform the function of construction-

trades apprentices. As a result, even before they have succeeded in learning the finer points of their principal military occupational specialty, from their very first days on the job they lose their skills as aircraft maintenance specialists. And this is fraught with undesirable consequences as regards observing flight safety procedures.

"The flying proficiency of the aircrews and the combat readiness of the subunits is the higher-priority item for us," states regimental party committee member Maj V. Yakovenko. "But the regiment must begin every working day with handling a great many routine problems, which in the final analysis are due to the poor quality of construction work."

The airmen are not demanding anything unreasonable. They need basic heat, light, and gas. The state allocates enormous funds to provide military personnel with the requisite working and living conditions. It does not seem an unreasonable demand that these funds be used efficiently and intelligently. But apparently this is the most difficult thing. For example, a considerable amount of money was allocated for construction of that flight personnel mess. But the amount of money spent grew as a result of the extended time this building was under construction, and to the detriment of quality. In service less than a year, this mess hall requires additional funds for repairs.

"To be frank about it, the military construction people do a poor job," states Maj Gen G. Onishchenko, deputy commander of the Transbaikal Military District. "If they had completed scheduled facilities on time and to the proper standard of quality, there would be no complaint. But construction jobs are piling up, money is being spent, and one senses no change for the better."

One might pose a reasonable question: what do the people in the district construction directorate think about this, and will they be able to take specific measures to complete planned construction and end the airmen's ordeal?

It is high time to approach an appraisal of one's work in a critical manner, it was emphasized at the Armed Forces Conference. But in resolving matters pertaining to organizing living conditions today, we should look not only toward tomorrow but considerably beyond. At times it may seem that a relative limit of improvement has already been achieved, and then a feeling of complacency develops. This feeling does not merely "lull" certain ill-starred organizers at various levels but also deprives them of the ability soberly to assess the situation. I believe that these words apply in full measure to the construction unit specialist personnel mentioned in this article.

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IDENTIFYING 'HUMAN FACTOR' IN PILOT-ERROR ACCIDENT-THREATENING SITUATIONS

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[Article, published under the heading "For a High Degree of Combat Readiness," by Military Pilot 1st Class Col V. Shagov and Candidate of Medical Sciences Lt Col Med Serv L. Drach: "Considering the Human Factor (Psychophysiological Analysis of the Causes of Errors by Flight Personnel)"]

[Text] The party's profound faith in the inexhaustible strength and capabilities of Soviet man rang out with renewed conviction at the the 27th CPSU Congress. Addressing ways to speed up the rate of development of the economy, the party forum named as one of the most important reserve potentials for growth the human factor, which is no less significant in Air-Force affairs as well. Intensifying it, ensuring that each and every airman labors conscientiously at his work station, producing full effort -- this is the highroad for increasing intensification and effectiveness of combat training, quality of flying and flight safety. It is particularly important here to consider physiological and psychological factors in analyzing faulty actions or decisions by personnel.

Record-keeping on and analysis of pilot errors, determination of their causes, and determination of effective preventive measures is a vitally important area of endeavor for commanders, political workers, and other aviation specialist personnel within the flight safety support system.

For a long time pilot error was considered to be the cause of a given emergency situation connected with incorrect or late aircraft (helicopter) control actions. The pilot alone was called the guilty party in the case of a mishap-threatening or air accident situation. The terms "personal" and "human factor" were viewed as one and the same and as a rule were identified with the terms "pilot error" and "culpability of flight personnel."

The rapid advance in aircraft technology, the increasing complexity of modes of aircraft combat employment, and increased demands on the professional qualities of the combat pilot are increasingly enhancing the role and significance of the ergonomic characteristics of aircraft and aircraft

systems. At the present time, for example, according to experts in aviation psychology and medicine, in from 30 to 40 percent of cases equipment malfunctions and deficiencies in conditions of flight operations are the reason for in-flight errors.

As is indicated by practical experience and the results of special studies, an error or faulty action by an airman is a multifactor phenomenon and includes an immediate cause, a principal cause, as well as attendant causes. This requires comprehensive analysis of all factors influencing the occurrence, the nature of occurrence, and the outcome of errors or faulty actions, as well as the involvement of various aviation specialists in this work, particularly commanders, political workers, engineers, doctors, and psychologists.

Theory of the personal factor and the human factor, elaborated in aviation medicine, is being widely utilized at the present time for such a combined analysis. It consists essentially in breaking down errors and faulty actions into two groups by cause: errors due primarily to the personal factor -- airman individual features which are unfavorable for flying (level of job proficiency, lack of discipline, state of health, psychological stability, etc), and errors due to the engineering-psychology concept "human factor" -- deficiencies and shortcomings in the means, conditions, content, and organization of flying activity (deficiencies in means of displaying information, controls, layout and arrangement of aircraft and helicopter cockpits, effect of adverse factors of job activities, health and hygiene conditions at the workplace, inefficient method of training aviation personnel, unsatisfactory leadership, command, control and support of flight operations).

This method of analyzing errors makes it possible to reach important conclusions for determining preventive measures to be devised. When assigning an error to the first group (personal factor), for example, these measures should be directed toward a specific pilot: additional dual check rides, practice sessions on the cockpit simulator, tests of knowledge of the requirements of applicable documents and knowledge of his aircraft, medical treatment or health-improvement measures, and therapeutic rest. When assigning an error to the second group (human factor), it is essential to eliminate deficiencies which negatively affect the quality of aircrew activities as a whole. One should more fully consider man's physical and psychological capabilities in designing and upgrading an aircraft and its equipment, alter or refine the conditions and sequence of performance of maneuver sequences, aviation personnel flight and theoretical training programs and schedules, the forms and methods of preparing flight personnel for flight operations, refine and detail the requirements of regulations and methods documents, and eliminate adverse social factors and factors connected with daily life and off-duty routine.

The need for such a thorough psychological study of flight personnel errors is also dictated by the fact that the most common errors, which externally are manifested identically, sometimes have different causes. Therefore an insufficiently complete analysis results in a simplified understanding of the factors causing a given emergency situation. Consequently the measures

elaborated in response as a rule have a narrow directional thrust and are insufficiently effective. We shall cite some examples.

A pilot who was flying an aircraft unequipped with an automated landing system during the day in IFR weather, was instructed by the tower to proceed to his alternate due to a sharp drop in visibility in the area of the field. While on his approach to the alternate field, the pilot drifted considerably from the localizer and was forced to execute a missed approach. On his second approach he broke out of the clouds, executed his approach visually, in conditions of reduced visibility, failed to align himself with the runway, came in hot, overran the runway and damaged his aircraft.

Another pilot, flying a combat jet equipped with an automated landing system, was ferrying it from an overhaul depot to his unit. He drifted off the localizer during a landing approach in IFR weather at an en-route field. Attempting visually to determine his position relative to the runway, he also dropped below the glideslope and broke out of the clouds. He touched down at excessive airspeed and well down the runway. The aircraft rolled off the far end of the runway and was also damaged.

While there are a number of common circumstances and conditions (adverse weather, requiring an instrument approach, landing at an unfamiliar field), the above examples also contain significant differences in causes of the accident-threatening situation. In the first example the method of landing approach employed at the alternate was the same as at the primary. In the second example, however, the pilot was making a landing approach at an en-route field without using the automated systems with which his aircraft was equipped and with which he was familiar. Consequently, in the first instance the pilot's mistake applies to his level of professional competence to fly in IFR weather in general, while in the second case the error pertains to level of preparedness to fly utilizing information which was incomplete for the pilot in question.

Analysis of flight documentation indicated that the pilot was making a landing approach to an alternate field for the first time. He had only recently been assigned to the unit and had not been flying in IFR weather on a regular basis. A check ride under the IFR hood following the incident in question confirmed that he lacked instrument-flying skills. It was determined that the accident-threatening situation was due to the pilot's inadequate personal level of proficiency. Additional dual training flights with an instructor and sessions on the flight simulator were scheduled as preventive measures based on the analysis results. The correctness of the conclusions was confirmed by the effectiveness of these measures: following additional practice sessions, the officer was able successfully to fly training sorties in IFR weather.

Analysis of the other pilot's flight documentation failed to reveal any peculiarities in his training. He had regularly flown in IFR weather and had taken on schedule and passed with good marks all instrument-flight check rides prescribed by the training sequence. As was already pointed out, however, pilots fly the overwhelming majority of sorties on this aircraft using the automated instrument landing systems. A question was raised in this connection: does the existing system of training pilots who fly combat

aircraft with automated landing systems provide the required level of reliability when switching over to flying manually?

A series of studies was conducted in order to answer this question. Two groups of 1st class pilots were given two types of task assignments on the flight simulator. The first assignment: after "takeoff," the instrument panel in the simulator cockpit was screened, the simulator was "displaced" to an alternate airfield in the vicinity of the base, the screen was removed, and the pilot was instructed to determine as quickly as possible his position relative to the runway and to execute a landing approach by the shortest possible path with limited fuel remaining. The second problem was similar to the first, but failure of the ILS localizer needle was added. Both situations were flown without using the automated landing systems.

Selected into the first group were pilots who fly aircraft which are unequipped with automated landing systems, while the second group contained pilots who regularly use such equipment.

In the course of the study, quality of task performance and level of pilot psychophysiological stress while performing the assigned tasks were recorded. The following table contains the results of the study.

Quality of Handling Navigation Problem With Loss of Bearings Relative to the Runway (landing approach)

a) without instrument failure

Группы летчиков (1)	Решили задачу, % (4)	Не решили задачу, % (5)	Время ориентирования относительно ВПП, с (6)	Грубые отклонения в пилотировании, % (7)	Прирост частоты пульса к фону, % (8)
Первая (2)	94	6	15,9	31	14
Вторая (3)	72	28	21,3	50	16

b) with ILS localizer needle failure

Группы летчиков (1)	Решили задачу, % (4)	Не решили задачу, % (5)	Способы решения задачи (9)			Грубые отклонения в пилотировании, % (7)	Прирост частоты пульса, % (8)
			Метод «проб и ошибок», % (10)	Заход через привод по системе, % (11)	Выход в расчетную точку, % (12)		
Первая (2)	85	15	15	40	45	15	13
Вторая (3)	59	41	41	35	24	30	21

Key: 1. Pilot groups; 2. First; 3. Second; 4. Accomplished task; 5. Failed to accomplish task; 6. Time required to gain bearings relative to runway, seconds; 7. Gross errors in flying technique, percentage; 8. Increase in pulse rate over background level, percentage; 9. Methods of accomplishing task; 10.

(Key to table on preceding page, cont'd) Trial and error method, percentage;
11. Used ADF, percentage; 12. Flying to calculated point, percentage

As is evident from the figures in the table, the pilots in the second group made more mistakes than those in the first group under complicated navigating conditions. Consequently, in our example as well the second pilot's mistake can be ascribed not so much to his personal lack of preparedness to fly in IFR conditions as to shortcomings in training subunit flight personnel who fly aircraft with automated landing systems, which fails to develop the necessary level of skill when switching over to manual control for one reason or another.

This would indicate that preventive measures should also be prescribed in the second instance as well, measures directed not only toward a specific individual but also all flight personnel flying aircraft with automated systems of this kind. Preventing errors of this kind requires changing the system of practice drills without using automated landing systems and increasing their effectiveness.

Study of errors falling within the human factor category depends to a considerable degree on completeness of statistical analysis of data on pilot errors available in the units. Both data on near-accident situations and those errors which are not categorized as near mishaps and recorded in the appropriate squadron logs can be used for this purpose. A methods approach from the standpoint of the personal factor and human factor requires conduct of such an analysis with classification of errors in the unit separately by flight personnel categories, aircraft types, nature of maneuver sequences being performed, and their conditions. This makes it possible to determine the most characteristic (typical) errors made by pilots of various categories in different conditions and to determine the specific features of a phase of operation of an aircraft of a specific type, which must be taken into account in the combat training and instruction process. In addition, such an analysis constitutes a foundation for more extensive synthesis of the causes of errors in order to consider them when designing fixed-wing and rotary-wing aircraft of new types and in the process of upgrading existing aircraft.

Of considerable importance for prompt determination of factors which diminish the effectiveness of pilot performance of job tasks and leading to loss of flight safety are organization and methods of analyzing in the units occurring errors in flying technique, navigation, combat flying, and aircraft maintenance. Study of the causes of errors by flight personnel requires that Air-Force commanders and other specialist personnel taking part in ensuring flight safety have knowledge of modern, scientifically-validated analysis methods.

Continuous repetition of errors within the same pilot categories in conditions of the same type and when working with specific systems, large-scale and steady occurrence of errors in aircraft of the same type and differences in the occurrence of errors in aircraft of different types, lack of a marked relationship between frequency of errors and individual peculiarities of pilots of the same category, as well as an unclearly-marked relationship

between errors and organizational-preventive efforts not connected with improving aircraft equipment and change in conditions and organization of flying activity constitute a basis for assigning pilot errors to the human factor category according to statistical analysis data.

In addition to statistical methods of analyzing pilot errors, other sources of information must also be used: flight recorder tape analysis results, comments by instructors, and results of medical examinations. It would be advisable periodically to synthesize pilot opinions on the design features and deficiencies of specific aircraft. Performance of such a comprehensive and thorough analysis of errors, based on data obtained by various aviation specialists, will help increase the effectiveness of preventive measures taken for the purpose of ensuring high quality of flying and flight safety.

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HISTORY OF AIR-TO-AIR COMBAT REVIEWED

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[Article, published under the heading "Tactics and Simulation," by Military Pilot 1st Class Col Yu. Kislyakov and Candidate of Military Sciences Col (Res) V. Babich: "History of Aerial Combat"; fourth part of five-part article; see Nos 1-3, 1986]

[Text] In 1920 approximately 70 percent of the assets of the Red Air Force were dispatched to fight the forces of bourgeois Poland, which had invaded the Ukraine, and Baron Vrangeli's White army, which was threatening the Donbass. Discussing air combat operations on the Western Front, the journal VESTNIK VOZDUSHNOGO FLOTA [Air Force Herald] cited the fighters of two squadrons operating in the Borisov and Igumenskoye sectors.

The first squadron, under the command of A. Shirinkin, was based at Slavnoye airfield and was assigned the mission of demolishing enemy fortified positions, demoralizing the Borisov garrison, destroying batteries and railway structures, engaging enemy aircraft, protecting observation balloons, and supporting infantry.

Upon arrival of the equipment, flight personnel immediately commenced combat operations. On 17 April, for example, the railyard where aircraft were being unloaded from a rail consist was attacked from the air. Four Polish aircraft dropped several bombs from a height of 400-500 meters; the bombs missed their target and exploded without causing damage to the train. The mechanics had managed to assemble only two fighters by this time. Squadron commander Shirinkin and wingman Petrov immediately took off in these aircraft. They chased the enemy away. The squadron commander damaged one of the aircraft with a machinegun burst.

After his defeat in the first engagement, the enemy no longer dared approach the airfield, never venturing more than 12-15 kilometers from Polish positions. It had become impossible to intercept Polish aircraft from the airfield, and therefore a staging airfield was set up 3 kilometers from the front line, to which alert-duty fighters would proceed surreptitiously and undetected. On 20 April 1920 three enemy airplanes appeared above Soviet positions. Shirinkin, Kuzin, and Petrov, who were standing alert at the time,

scrambled to intercept the intruders. A new mode of fighter combat emerged -- ambush. As a result of the element of tactical surprise, the adversary was unable to prepare to defend and, following swift attacks by the Soviet pilots, found himself 2 aircraft down (one pilot was captured).

On 1 May an enemy reconnaissance aircraft was spotted flying high above no-man's-land. A 4-aircraft alert element, consisting of Shirinkin, Sobolev, Burov, and Kuzin, took off and broke up into pairs. One 2-aircraft element, executing a flanking maneuver, blocked the adversary's retreat, while the other pair attacked him. The reconnaissance aircraft was shot down. That same day Shirinkin and his flight engaged an enemy bomber. Sustaining damage, the bomber dumped its bombs before reaching the target and headed in a descending flight back toward friendly territory. The initiative at the war front shifted over to the Soviet pilots. In August 1920 Red Military Pilots Sobolev, Burov, and Kuzin were awarded the Order of the Red Banner for successful combat operations.

According to a captured pilot, a group of "foreigners" flying new aircraft was expected to arrive at Zhodino airfield. To check out this information, the commanding officer scheduled a reconnaissance-in-force mission, which included a bombing strike on the airfield. A psychological analysis of the enemy's tactics suggested that this would definitely be followed by a response move. In fact, that same day a pair of enemy aircraft attempted to attack a Soviet observation balloon, but encountered a screen of predeployed fighters. The outcome of battle was in favor of the screening element. The commander's prediction of the possible development of events and his decision to predeploy his fighters into the screening zone proved to be entirely correct.

On 8 May Soviet pilots dropped onto Zhodino airfield a message signed by squadron commander Shirinkin and military aviation commissar A. Kuznetsov, which stated, in particular: "...The Polish group of Anglo-French flunkies has high-handedly rejected our peace proposal and cast us a challenge. We Red Pilots boldly accept this challenge, have total confidence in our imminent victory over all the cowardly hirelings, bought by the Ententes payment in gold, and are prepared to parry any treacherous thrust into the back of the young Workers' and Peasants' Republic...."

Following a brief lull at the front, on the morning of 14 May Red Military Pilot A. Petrov, while flying over Borisov, was suddenly attacked out of the sun by a new interventionist fighter. Petrov succeeded in sidestepping the attack by winging down into a slip and entering a spin. The adversary, however, possessing a speed advantage, again took up an advantageous position and opened fire. The red pilot realized that he would be unable to escape by following a straight-line path. He then executed three loops in succession and pulled his Spad out of a dive at a height of 30 meters. But he was up against an experienced adversary, who continued the pursuit. Petrov desperately executed zooming and diving maneuvers and ducked down between the buildings of Borisov, but was unable to break away. He deliberately drew the circling dogfight toward the Berezina. Reaching the river, he descended to 1 meter from the ground and, banking his aircraft from one side to the other, approached the trenches. The adversary had caught up and was positioned above him but, fearing ground fire, finally broke off and departed. Petrov landed

his bullet-riddled aircraft at his home field. This engagement demonstrated the clear superiority of the enemy aircraft's performance characteristics. Only expert flying technique enabled Petrov to extricate himself from this deadly clash.

Under the altered circumstances it was dangerous for single aircraft to fly alone. The shortcomings of the equipment could be compensated for only with group actions and mutual support. The red pilots beat the enemy in changing their tactics.

Squadron commander Shirinkin, accompanied by his comrades in arms Kuzin and Petrov, took off from ambush. There were a solitary reconnaissance aircraft and a bomber escorted by a fighter in the air at the time. Spotting our three fighters, the reconnaissance pilot immediately headed back for friendly territory. The Soviet three-fighter element then spread out in order to block the bomber's retreat and proceeded to maneuver to cut him off and attack. Appraising the situation, the escorting fighter abandoned his charge and beat a hasty retreat. The slower-moving bomber fell behind. The bomber's aerial observer proceeded to put out defensive fire. Shirinkin, however, executed a skillful maneuver and ended up 30 meters below the bomber's tail. Three bursts of machinegun fire turned the enemy aircraft into a flaming torch.

Aleksey Dmitriyevich Shirinkin was awarded a second Order of the Red Banner for the squadron's successful combat operations and for downing enemy aircraft in aerial combat on the Western Front. Shirinkin, one of the first Soviet air aces, began his combat career in 1916 as a senior NCO in the 1st Fighter Detachment. A report has been preserved which states that on 10 September 1917 detachment commander A. Kazakov, accompanied by Shirinkin, attacked 4 enemy airplanes in the vicinity of Gussyatin. Shirinkin shot one of them down, but he himself received crippling fire and made a forced landing. Again in combat over Kamenets-Podolskiy on 13 September, he damaged an enemy aircraft with accurate machinegun fire. After the Civil War A. D. Shirinkin continued service in the Air Force in command positions.

The pilots of the 2nd Battalion, based at Saltanovka airfield, commenced combat operations a bit later than their comrades at Slavnoye. They also set up an ambush on the bank of the river, and would take off on combat air patrol at the enemy's favored flying time (from 0800 to 1100 hours and at dusk). The enemy constantly avoided combat, however. Our pilots flew reconnaissance and took part in bombing enemy troop positions, but they wanted very much to fight the "Entente's payment-in-gold hirelings" in the air. And the enemy was thrown a challenge.

Toward evening on 9 May Red Military Pilot Sapozhnikov climbed into his cockpit with a 25-pound bomb (a practice which was not at all recommended, incidentally) and, obscured by haze, approached an enemy airfield at an altitude of 1,000 meters. Reducing throttle, he descended silently to a height of 700 meters and dropped the bomb at a hangar. He then executed a series of seven half rolls and split S [perevoroty] (which were called pereoprokidyvaniya at that time) with climbing rolls and, following a farewell spiral, headed for an airborne balloon and forced it to descend.

This was of course too daring a challenge. The enemy could not leave it unanswered. The following day, 10 May, three enemy bombers undertook a bombing raid on Saltanovka airfield. A screen of CAP fighters, however, was lying in wait for them. Sapozhnikov and his wingmen, Gvayta and Seregin, intercepted the aircraft 500 meters from the airfield. After the first attack the enemy pilots released their fuze-unarmed bombs (not one exploded) and accepted combat. In his enthusiastic excitement, Seregin immediately expended all 45 rounds, while Gvayta's machinegun jammed right at the outset. It was up to Sapozhnikov to deliver accurate fire. Sapozhnikov's first two passes were unsuccessful. On the third he succeeded in getting into the aerial observer's blind spot. Three short bursts at extremely close range decided the outcome of the battle -- the enemy aircraft, crippled by a severed fuel line, made a forced landing (the pilot and observer were taken prisoner). The three Soviet fighters then jumped another enemy bomber which, after sustaining damage, landed among friendly troop dispositions. As the pilots later stated, if Gvayta's machinegun had not jammed, "not one of the visitors would have returned home." On 12 May pilot Sapozhnikov was awarded the Order of the Red Banner at a formation presentation ceremony.

Georgiy Stepanovich Sapozhnikov, who began his flying career in 1916 in the 16th Corps Aviation Detachment, was killed on 8 September 1920 when his engine failed during a demonstration flight. VESTNIK VOZDUSHNOGO FLOTA reported at the time that the combat exploits of this intrepid pilot were well known both at Kazan in 1918 and on the Western and Southern fronts. Ever cheerful, it gave him particular pleasure to climb into the cockpit of his small but sturdy Snipe (Sopwith) with the red stars on the wings and the ace of spades on the fuselage. The aerial adversary preferred not to encounter the "ace of spades." Sapozhnikov's combat engagements, constructed on a foundation of virtuoso flying in attack style, were a model for the Red fighter pilots.

Soviet fighter combat operations on the Southern Front were distinguished by the fact that, although inferior in numbers and equipment, they employed offensive tactics bordering on the risky and displayed exceptional courage and skill. The exploit of Red Military Pilot P. Vasilchenko, who engaged 7 enemy aircraft, was a remarkable feat of the Civil War. Aviation group commander I. Spatarel described this incident as follows.

"Seven White Guard de Havillands were proceeding in close formation, with the intention of bombing a river crossing which was of great importance to our forces. They had already commenced their bombing run when a little Nieuport popped out from behind a cloud and attacked the leader. The de Havilland abruptly veered from its heading, and the bomber formation broke up. Seeing what the situation was, however, they regrouped to fight. Two aircraft climbed to a higher altitude and dive-attacked. Machinegun tracer rounds streaked past the Nieuport's cockpit. Vasilchenko, expertly maneuvering, put himself in an advantageous position and squeezed off a short burst. Pitching nose down, the Vrangal aircraft proceeded to descend, and fell to earth beyond Bolshaya Kakhovka.

"Unable to take the pressure, another de Havilland turned tail. The leader, however, bringing the remaining four into close formation, proceeded to lead them toward the crossing site. During this time Vasilchenko gained altitude

and attacked the group from above. The enemy formation once again broke up. The wingmen released their bombs short of the target, swung around and fled eastward. The leader was the sole remaining aircraft of the seven-ship formation. He had apparently decided to continue the engagement. Vasilchenko was running out of fuel and ammunition. There was every indication that the adversary was a seasoned pilot. But the Soviet fighter took skillful advantage of the de Havilland's inferior maneuverability. Executing a precision maneuver, the Nieuport placed itself on the adversary's tail. Vasilchenko fired his last burst practically point-blank. The de Havilland plunged to earth just beyond the battle line. The Red soldiers, who had been observing the battle, gave triumphant shouts and tossed their Budenovka caps into the air."

In 1920 the newspaper IZVESTIYA reported that at 1510 hours on 14 October, during reconnaissance of an enemy airfield, Red Military Pilot Vasilchenko shot up 2 aircraft standing on the flight line, after which he proceeded to execute various aerobatic maneuvers to challenge the enemy pilots to battle. Enemy aircraft took off 10 minutes later. One of them proceeded to climb to higher altitude, but delayed its maneuver, and Vasilchenko was able to attack the other aircraft with machinegun fire, forcing it to land. The other aircraft also came under fire by the Soviet aircraft following an unsuccessful attack and was forced to land.

After the Civil War Nikolay Nikolayevich Vasilchenko, who had twice been awarded the Order of the Red Banner, became a division commander and served as a military attache in France.

Former aviation group commander and twice recipient of the Order of the Red Banner I. F. Voyedilo discusses in his memoirs an aerial engagement fought by Komsomol member Yulius Krekis, a young pilot in his group. As he was returning from a reconnaissance mission, the pilot spotted a formation of 6 enemy aircraft headed toward Soviet positions. Quickly analyzing the situation, he realized that the element intended to hit Soviet infantry which was about to launch an assault. Yulius decided to force the enemy to drop his ordnance short of the target. With a shallow descent angle, however, there was no possibility of penetrating the aerial gunners' heavy fire. He then climbed to a higher altitude and employed Yevgraf Kruten's "falcon attack" tactic. If the diving "psychological attack" failed, he could collide with the enemy. But the enemy formation broke up and its all-round defense was disrupted. Exploiting the superior maneuverability of his lighter aircraft, Yulius attacked. The Vrangeli pilots released their bombs over empty ground and turned back toward friendly lines. Komsomol member Krekis had once again demonstrated that boldness can win the day. He had scored two aerial victories. He was awarded the Order of the Red Banner for his exploits in battle with the forces of Baron Vrangeli.

During the trying Civil War years Red military pilots fought bravely on all fronts, defending the freedom and independence of the young Soviet Republic. New tactics, totally new principles and new, socialist ethics and morality of

Soviet combat pilots were born in those early years, which made it possible in later years successfully to smash enemies of our homeland who were attempting to probe with bayonet the strength of Soviet rule. (To be concluded)

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NEGLIGENT FAILURE TO PERFORM COCKPIT PROCEDURES THREATENS FLIGHT SAFETY

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 4, Apr 86 (signed to press 5 Mar 86) pp 40-41

[Article, published under the heading "For a High Degree of Flying Efficiency and Flight Safety," by Maj V. Dolgishev: "Measure of Responsibility"]

[Text] "...Wherever talk about success is substituted for party-minded analysis of the actual situation, all party activity is deformed, and there is created an atmosphere of complacency and an attitude of immunity to normal rules and regulations, leading to the most serious consequences."

From the Central Committee Political
Report to the the 27th CPSU Congress of
the Communist Party of the Soviet Union

The unforeseen had occurred: the afterburner failed to cut in on takeoff, and the aircraft returned to the ramp. What had happened? Some felt that it was a mechanical failure, while others believed that the cause was faulty inspection by ground personnel. But the cause proved to be simply that the pilot had forgotten to flip the Maximum Afterburner circuit breaker.

At first people could not believe this, for the aircraft was being flown by Military Pilot 1st Class Maj Yu. Lavasov, who had logged hundreds of hours. What was the reason for this error by an experienced pilot? Simply that he had broken a cardinal rule: he had failed to go through his cockpit preflight checklist item by item.

Two days later it happened again: a pilot had failed to carry out a mock attack on a ground target at the range, because circuit breakers were in the off position. And once again a pilot 1st class was to blame for a dangerous in-flight situation: Maj N. Dmitriyev had failed to switch on the circuit breakers during his preflight cockpit check. Soon Lt V. Ivanov followed this disturbing "example" of his more senior colleagues. He also was forced to abort his mission. And for the same reason: failure to flip a switch during the cockpit check.

Thus three mishap-threatening incidents occurred within a short period of time. And all involved gross violation of regulations and documents governing flight operations. How could this happen? The pilots had been seduced by complacency and reliance on their amassed experience. Without noticing it they had crossed the line separating complacency from irresponsibility, inner lack of organization from indiscipline. And this had become possible because effective indoctrinational and preventive measures had not been taken in a prompt and timely manner. Unnecessary relaxation of demands and disregard of so-called trivial deficiencies and errors of omission had led to serious violations of guideline documents and had aggravated the situation both on the ground and in the air.

A patent lack of demandingness in assessing these pilots' actions is not mere happenstance. The fact is that violation of flight regulations and indiscipline are frequently kept hidden. Such incidents must be brought to light, in contrast, for example, to a professional methodological error. For this reason there sometimes occurs the temptation "not to notice" a given violation or not to go beyond lip service, just to get it "checked off," so to speak. In addition, while in order to prevent a methodological error it is sufficient to hold an instruction class, several drill sessions, and a dual flight with an instructor, indiscipline must be countered with an entire aggregate of well-thought-through, thoroughly-prepared political indoctrination measures aimed at increasing a pilot's sense of responsibility for his assigned task.

But let us return to officer Lavasov. He was reprimanded, with the assumption that afterburner cut-in failure on takeoff had happened purely by accident, and that was the end of things, but if leader personnel and party members fail to give a firm party response to such "chance occurrences," they begin to increase in frequency. And this is what happened. A second and a third mishap-threatening situation followed.... And these were soon followed by a fourth. This time the guilty parties were aviation engineer service personnel airframe and powerplant inspection and maintenance group technician Sr Lt A. Gushchin and group chief Capt N. Simonenko.

It happened as follows. Following routine inspection and maintenance, squadron deputy commander Maj E. Delpers and flight commander N. Rufanov had taken the aircraft up to test-fly it. Soon after takeoff hot air suddenly began entering the cockpit. They shut off the valve on instructions from the flight operations officer, but this had no effect. They were forced to land the aircraft, after circling in the vicinity to burn off fuel.

Ground crewmen quickly located the problem: incorrect installation of the line which feeds hot air from the engine to the automatic pressurization unit. This could have been detected when testing the engine following maintenance and taking automatic pressurization unit readings when at the Maximum and Minimum settings. That is, the proper maintenance procedures sequence for this system should have been followed. This had not been done, however, while normal pressure readings had been entered in the maintenance log.

And once again commanders, political workers, party and Komsomol activists failed to draw the proper conclusions from this, although of course some steps

were taken: requisite additions were made on the maintenance procedures checklist and the guilty parties were given disciplinary punishment, and they were also made to answer to their fellow party members. But no radical change was made in organizing efforts to prevent air accidents and mishap-threatening situations. Officer-supervisors V. Myagchenko, A. Yeshchenko, and A. Artemov did not succeed in fully eradicating excessive attention to form with consequent detriment to content, as well as unnecessary situation simplification. The unit party organization also failed to display aggressiveness. The party committee secretary and members thus failed to place adequate demands on party members, to increase their personal responsibility for ensuring quality of flying activities, to establish rigorous monitoring and verification of execution. But it is important not only to give moral incentive and encouragement to conscientious and disciplined aviation personnel but also to have the ability to hold strictly to account irresponsible individuals and persons lacking initiative. The chain of violations and departures from the requirements of regulations and documents governing accident-free flight operations was not broken....

"It is past history," airmen would say when the subject of these incidents was brought up. "Measures were taken against the guilty parties. Appropriate conclusions were drawn. Why continue discussing the matter? After all, we have a great many positive things as well in our performance...." They were essentially saying that there was no point in attaching particular significance to the violations of procedures.

I also heard a different opinion: one should not simply accept errors of omission. The majority of airmen, cognizant of the degree of personal responsibility for the common cause, objectively appraised their work performance and expressed dissatisfaction with achieved results and the desire to find the shortest, effective ways to correct deficiencies.

Where do the boundaries of responsibility lie? Where is that line below which irresponsibility, indiscipline, and negligence begin? Obviously the point in question is those requirements of regulations and documents in which the experience of generations of airmen is concentrated. The high quality of flying performance, flying effectiveness and flight safety depend on how conscientiously, precisely, and flawlessly these requirements are carried out. On the other hand, where is that opposite point, above which maximum responsibility (constantly growing) can no longer be placed on a person? I believe that it is difficult to place a clear-cut boundary here. In any case it depends on the actual capabilities of a specific individual, his willingness and readiness to perform a heroic exploit, and his self-sacrifice.

...During a landing approach the left landing gear refused to extend on an aircraft flown by Lt Col G. Kovalenko. The pilot made, to put it bluntly, a bold decision: to put his aircraft onto a snow-covered alternate runway, landing on the nose gear and belly. The pilot safely landed his aircraft.

Party member G. Kovalenko's excellent moral-psychological and professional qualities and his feeling of responsibility for the labor of many other people made it possible to avert a serious flying mishap and to avoid totalling an

expensive aircraft. After determining the cause of the malfunction, the command authorities took the requisite preventive measures.

On the whole the outfit in question is successfully accomplishing its assigned missions. The men scored high at a tactical air exercise and are successfully moving forward in mastering the flight training program, including complex training activities. Advanced know-how is being brought to bear. Squadron commander Lt Col V. Yevstigneyev, one of the top pilots in the unit, relies on the party organization in his work and skillfully utilizes its mobilizing power. A great deal is being done in this outfit to enhance the vanguard role of party members and to increase the effectiveness of their organizational and party-political work aimed at instilling a feeling of responsibility in Air-Force personnel. They are focusing principal attention on rigorously holding individuals personally responsible for observing regulations and performance of job-related duties by each and every CPSU member. Various work forms are employed: dialogue, public defense of socialist pledges, and reports, including accountability reports, at bureau sessions and party meetings. The work style of this squadron's command element and party organization is characterized by constant concern for the men and the endeavor to teach each and every airman with examples of strict observance of flight rules and regulations, frank and firm appraisal of one's labor. It is unfortunate that this is not yet widespread in the unit, for this constitutes an unutilized reserve potential for improving the effectiveness and quality of combat training.

There are also difficulties and problems in the collective, resolution of which the party organization, and particularly the party committee, must resolutely address. Party members have a broad range of concerns. The principal, paramount concerns include increasing combat readiness, strengthening discipline, and instilling a sense of responsibility in every individual. The human factor plays a particularly important role in accomplishing these tasks, for in the Air Force the quality and effectiveness of work depend to a determining degree on the individual, his level of job proficiency and his sense of responsibility for the assigned task and precise observance of the requirements of documents governing flight operations. The chain of errors which a single person can set into motion results in appreciable losses, nullifying conscientious labor on the part of the entire outfit. It is not mere happenstance that the majority of mishap-threatening situations in this outfit have occurred through the fault of personnel, due to incompetence and indiscipline. But commanders, political workers, and party organizations failed firmly to address and appraise the actions of aviation personnel.

And what about the party committee? At the present time its secretary and members do not delve very deeply into problems of combat training and commander training, and insufficiently fully tie in the accomplishment of the specific tasks of each flying day with increasing the discipline and responsibility of all categories of personnel. Nor has a single party member yet been strictly brought to account.

The aggressiveness of party organizations depends in large measure on how substantively they are directed by political agencies. Practical experience

indicates that it is greater if a political worker delves deeply into a party organization's affairs, controls the reorganization processes taking place within it, has adequate persistence and tactfulness in teaching party activists new approaches to organizing things, and motivates toward innovativeness and a constant search for reserve potential. Unfortunately political worker Lt Col V. Myagchenko has not yet fully succeeded in accomplishing these tasks and rising to the full level of that personal responsibility which is placed on him as a leader-Communist.

The party teaches us that without thorough reworking of organizational and indoctrinational work style and without effective mobilization of the human factor, it is impossible to achieve success today in a single work area. This applies directly to the life and affairs of Air-Force outfits and their party organizations. The human factor is a content-filled concept which encompasses the responsibility of each and every airman for his military labor, a high degree of organization and discipline, conscientious and precise observance of the requirements of regulations, manuals, and other documents governing accident-free flight operations.

Here is one typical item: everybody with whom I spoke in the unit and at higher headquarters mentioned these well-known, by and large very simple items as an essential condition for achieving a fundamental improvement in the state of affairs. Nor was this mere happenstance. Mobilization of these important components of the human factor is in line with (we might even say in the main channel of) all our activities pertaining to implementing the directives of the the 27th CPSU Congress and achieving all plan targets.

To make the human factor from what is sometimes, as we can see, a weak link in the "man-machine" system into its most reliable component is a task requiring immediate accomplishment. This is a demand of the times. We should right now direct aggressive, persistent, purposeful indoctrinational and party-political work in the Air-Force collective toward this goal, and not only in words but in deeds.

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MISSION TO REPAIR, RESTORE TO SERVICE SALYUT 7 STATION

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 4, Apr 86 (signed to press 5 Mar 86) pp 44-45

[Article, published under the heading "Cosmonaut Training," by AVIATSIYA I KOSMONAVTIKA special correspondent Candidate of Technical Sciences Col V. Gorkov: "Unusual Flight"; first part of two-part article]

[Text] 25 years ago mankind ushered in the age of manned space flight. The trail blazed by Yu. Gagarin has become a well-beaten road which approximately 200 cosmonauts have trod. Many of them discovered something new on their journey. But not all of them had such critical and dangerous tasks to perform as the recent mission commanded by V. Dzhanibekov. AVIATSIYA I KOSMONAVTIKA special correspondent Candidate of Technical Sciences Col V. Gorkov relates how the crew trained and their work activities during the first days in orbit.

Who Would Be Going?

One spring day in 1985 Salyut 7 suddenly was no longer responding to control commands. At the same time all communications with the orbital vehicle went dead. On that day the experts were unable precisely to say what had happened on board the station. An unusual situation had arisen. People still had vivid recollections of the descent to Earth of the out-of-control Skylab, when the entire world was tuned in to radio reports on its predicted trajectory. And many persons living along the vehicle's path thought with horror about the possible consequences. For this reason perhaps the most important objective in the forthcoming efforts was to prevent a repetition of the regrettable events connected with the U.S. space station. The very circumstances dictated essential actions: dock with and reestablish control of the orbital station and, if possible, continue using it.

Behind the meager lines of the formulation of these tasks lay a vast quantity of work which can be fully appraised only now, a year later. But during those spring days in 1985 the experts had to analyze the current situation painstakingly and meticulously, to present proposals on the configuration of a space transport vehicle, draw up a comprehensive cosmonaut training schedule and, finally, determine the makeup of the crew.

A distinctive feature of the forthcoming job was the fact that it was totally new. A great deal has been written about manned missions, and at times it seems to some people that no longer do any problems exist, that a gradual process of human habitation of space is taking place and that the word "for the first time" has long since receded into history. And in fact, years have passed since the first orbital flight by Yu. Gagarin, the first 24-hour orbital flight by G. Titov, the first spacewalk by A. Leonov, and the first spacecraft docking by V. Shatalov. On the one hand this is true. On the other hand, however, no matter how reliable equipment may be, there exists a probability of failure. Under the circumstances it was impossible to find answers in any manual, book, or set of instructions to many questions which had arisen, questions which will be discussed below. Practical realities had raised these questions for the first time. They had to be answered by experts, with the direct participation of cosmonauts -- those to whom the forthcoming repair operations would be entrusted.

First of all it was necessary to select an optimal crew. A three-man crew, an arrangement which had proven effective on preceding missions, was rejected at the very outset. The problem had to be attacked not by numbers but by skill and ability. It was also essential to carry along an additional fuel supply to increase the chances of rendezvous with the silent station. The choice of flight engineer was determined immediately. Viktor Savinykh was a member of the crew which had been training for a mission on board the Salyut 7. He was temporarily assigned to the "repair crew," so that in the future, if the possibility arose, he could rejoin his former team. Thus another organizational variation in the program of manned exploration of space was determined in the course of this unusual mission.

"I have known Viktor for many years," Vladimir Dzhanibekov said after the mission. "I always felt that he had an ideal character and personality for a difficult job in a single 'unit.' Lively and sociable, but at the same time stable and composed in the face of setbacks, exceptionally hardworking, of unflagging spirits, with a sense of humor for 10 people, and an optimist at the most difficult times. Viktor is intimately knowledgeable about the station systems, for he is one of the people who designed it."

The mission commander was quite another thing altogether. Four candidates were considered over a period of 10 days. Ultimately Dzhanibekov was chosen. Why was this? It is believed that during training a cosmonaut takes into account the experience of previous manned missions. This is an essential but inadequate condition. A complex mission can be accomplished only if one possesses a high degree of professionalism. For this reason, during the training process the cosmonauts, mentally going through emergency situations, literally torment the methods specialists with questions. Vladimir Aleksandrovich is such a person. Then why was he chosen? Evidently because he stands out among his comrades by the fact that his range of interests is a bit broader, that he can see a bit further and do a bit more than the others. This was noted by the administrators who recommended him as mission commander.

Dzhanibekov unquestionably realized that it is also possible to possess less total knowledge but to work with that knowledge more freely. Encountering an

abnormal situation, such as when he and Savinykh were installing an additional solar battery panel, a cosmonaut should report the situation to mission control and wait for recommendations. Duty obliged Dzhanibekov to report what had happened, and he carried out that duty. But the honor of a cosmonaut, a Communist, and Soviet citizen demanded more.

In war memoirs we have frequently read about how at the front command and control of subunits and units would frequently become paralyzed due to loss of communications. In orbit the situation sometimes becomes the same as in combat. From time to time a crew loses communications with the ground. And the situations which can arise are similar to combat in terms of the danger involved. There is no time to wait for communications with mission control to be reestablished. A decision must be made. At critical moments one must have the ability to act in place of an engineer, a doctor, and other specialists. And Dzhanibekov made a decision on that mission. The crew corrected the malfunction, and they managed to install the additional solar panel sections with their own resources by commencement of communications.

Today we are justly proud of the results achieved by V. Dzhanibekov and V. Savinykh. They lived up to the expectations of that team numbering in the thousands which had prepared them for their mission into space, and they lived up to the faith of the Soviet people, who were closely following events during this unusual mission.

Starting Is Half the Job

"I have a lot of praise for the ballisticians -- our space navigators, who were able on the basis solely of visual observations and calculations to bring the spacecraft close enough to the station that the crew could take over control with complete confidence," recalled V. Dzhanibekov. "This was no easy job, for one of the vehicles was 'deaf and dumb' and was providing no information whatsoever on its motion in orbit. The ballisticians did a tremendous job, laying the groundwork for the ultimate success of the mission."

And the fact is that such a task was accomplished for the first time in the history of the Soviet space program. Our knowledge of the parameters of the Earth's atmosphere and gravitational field is merely a model of the "truth," and the station's calculated parameters contain the errors of this model. To these errors are added the tracking stations' telemetry errors. The ballisticians focused attention on this fact and proceeded to seek additional possibilities in the mathematics and in refining the mission support programs. Reasonable compromises were needed here. For example, a slight increase in the decay potential of the Earth's gravitational field exerts a quite appreciable effect on the computer time required to solve a system of differential equations, even with the most modern computer hardware. The ballisticians' capabilities are not limitless in this area.

Or take another example. Even if one possesses absolutely precise knowledge of the elements of a station's orbit and predicts its motion on the basis of these elements, over a period of 24 hours errors will amount to tens of kilometers due to diurnal change in density of the atmosphere. "Space

weather" must be considered on practically every revolution. In short, that same rule that applies to marksmanship on Earth also applies in space: if you want to hit the target, do a better job of aiming. Reduce errors, if not to zero, then to the minimum -- this was the task facing the ballisticians.

The ballisticians performed their work day and night, to the accompaniment of the musical sounds and winking lights of the computer. And they achieved victory. In spite of the paucity of information, they increased by practically a full order of magnitude the accuracy of placement of the Soyuz T-13 spacecraft into the rendezvous area.

This was accomplished as follows. It was necessary to determine an overall mission ballistic configuration and to devise a control algorithm for docking. Let us recall that the standard version of a manned spacecraft employs a 24-hour approach configuration, while a 48-hour configuration is used for a supply ship. A Soyuz T overtakes the station practically at the speed of an airliner, while a Progress moves less hastily, like a passenger express train. In our case, as the reader has already grasped, it is wiser not to be in haste. Repeated refining of the station and transport craft orbital parameters makes it possible more precisely and finely to configure the flight trajectory into the rendezvous zone and to enhance the reliability of execution of all operations. This is why a 48-hour long-range guidance control configuration was employed.

"At the close-in guidance control phase," stated I. Sukhorukov, one of the leading methods specialists at the Cosmonaut Training Center, "the standard version of the Soyuz T spacecraft control system prescribes a coordinated effort with the Salyut, that is, transponder signals are transmitted from the station. This was out of the question on this mission. It was necessary to devise a new method of approach, new means."

Such a method was devised. As the previous method, it involved using an onboard computer and measuring parameters of relative motion. It is true that in place of the standard radar system for measuring range, speed, angular velocity, line of sight and angles, they would be using a laser rangefinder, a modified Baryer instrument, a pilot's sighting device, and a programmable computer. The difference lay in the fact that at the juncture point between long-range and close-in guidance control, prediction correction would be made not for the entire set of parameters most recently fed into the computer from the ground but on phase angle alone, which can be determined with the pilot's sight and computer. The onboard digital computer system contains positional orientation data and, receiving a bearing to the station, will determine the angle mismatch and will make appropriate changes in the approach program. This required only additional refinement of the onboard computer algorithms. These were the initial conditions for method study and development. Crews led by V. Dzhanibekov, L. Popov, Yu. Malyshev and A. Berezovoy took part in conducting the experiment.

"In your opinion, what qualities characterize Dzhanibekov?" I asked A. Belozerov, one of the developers of the new method.

"Vladimir Aleksandrovich is conscientious, cool, calm and composed, and has considerable space flight experience," replied Arnold Viktorovich. "In addition, he is better than the others at determining his bearings in space. This quality proved highly valuable. In the case under discussion, in contrast to the standard setup, control of spacecraft approach had to be handled not with the cosmonaut's sight mounted on the spacecraft's longitudinal axis but through a side viewing port, using field-expedient means. At this point the design engineers mounted additional controls for controlling motion of the center of mass and motion around it. Vladimir Aleksandrovich is an amateur radio enthusiast and can repair radios and TV sets. This is also important if you consider that he and Savinykh, in addition to docking, were to perform repair operations. So he had, as they say, a full hand."

We shall not describe the process of method development or discuss how much time was spent on getting the crews into the "proficiency of performance envelope." Those who instructed and those who trained carried out their duty with honor. We shall merely note that the most difficult task for crews in the training sessions was getting the sighting line angular velocity down. The methods specialists, concerned by this, fairly rapidly found a simple method of teaching their charges where they should devote particular attention. A cosmonaut takes his seat in the simulator, and he sees displayed in front of him a placard: "Cancel lateral drift!"

One can judge the degree of effectiveness of this device from the following incident. When V. Dzhanibekov, already in orbit at the time, was asked by mission control if he had any message for "Chegety," who were in the process of accomplishing a rendezvous with them, he replied: "Cancel lateral drift!"

In addition, the methods specialists recall that Dzhanibekov on more than one occasion attempting to go beyond the framework prescribed by the method. Vladimir Aleksandrovich subsequently explained his actions. It turns out that he did this specifically for the purpose of determining how to proceed in a given instance if such a situation arose.

In the latter half of May the crews and methods specialists flew to Baykonur. At Baykonur considerable work on training the crews of V. Dzhanibekov and L. Popov was done by specialists from the Cosmonaut Training Center, let by V. Gotvald. The ground segment of the mission ended with the traditional cosmonaut viewing of the film "White Sun of the Desert."

"Do Not Be Too Lazy to Study, Do Not Fear the Unknown"

Dzhanibekov learned this Mongol saying from Zh. Gurragchi, with whom he had trained for an Interkosmos Program mission. He liked it a great deal, for he considers laziness and habitual gossiping to be among the most unpleasant human vices, and the unknown is the cosmonaut's constant companion. This is a specific feature of their job -- to investigate the unknown. But that which fate held in store for them on board the Salyut 7 station involved many unknowns.

In training the V. Dzhanibekov crew, particular attention was focused on instruction and practice in perfecting an approach mode involving an uncontrolled orbital station. Everybody was aware that this was the main link in the chain of problems being examined. Nevertheless docking is only half of the job if one considers the principal mission. The ultimate objective was to reestablish station control.

A fairly large team of specialists, representing the organizations involved, was working on solving this problem. Performing an analysis, they concluded that station control had been lost as a result of failure of one of the units. It was also possible that several assemblies had ignited. This means that the air inside the station might contain impurities harmful to human health.

The suspect unit was removed from a twin of the Salyut 7 and disassembled into components. In special chambers they burned insulating wrapping, varnish-coated wires, and other components. They then determined what quantities of what substances were released. They performed conversion computations for station interior volumetric space in order to determine the concentration of such harmful impurities as carbon monoxide, oxides of nitrogen, and cyanide compounds. The air proved relatively safe. But what if not one but several units had burned? What would the concentration of harmful impurities be? What awaited the cosmonauts at the station? They proceeded to calculate for a worst-case scenario. It was necessary to provide the capability to work initially in special protective masks. Working in this "garb," the cosmonauts would have to perform an analysis of the gas composition of the station atmosphere according to a specific method. The fact is that V. Dzhanibekov's crew would be working in conditions not only of a restricted field of view caused by the protective masks, but in conditions of limited visibility as well. The experts assumed that there might be no lighting available on board the station, and repairs would have to be performed by flashlight. Since this would be the first time such work was performed, it was necessary to determine analysis methods and means of performing analysis.

As we know, the station's working and transfer bays are connected by a pressure equalization valve. This valve was also utilized for the preliminary examination, with specialized attachment devices fabricated in advance. Tests to determine degree of valve seal and the air sampling process proper were performed on identical equipment at the Cosmonaut Training Center and the Medical and Biological Problems Institute, initially by experts on life-support systems and subsequently by the crew. Analysis was performed with an Analiz-2 instrument: they would open small glass tubes containing a powder, and air from the work bay would be passed through the tubes. The presence and concentration of a given harmful impurity would be determined by the extent and hue of coloration. These tests helped in perfecting a device to collect air samples and in developing methods. They also showed that a single testing kit was not enough to make a reliable assessment of the content of each impurity component (four were tested). Two Analiz-2 instruments were taken along on the mission. (To be continued)

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1985 SOVIET SPACE LAUNCHINGS

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 4, Apr 86 (signed to press 5 Mar 86) pp 46-47

[Tabular Listing: "Table of Launchings of Space Vehicles in the USSR in 1985"]

1 Дата запуска	2 Название аппарата	3 Началь- ный период обраще- ния, мин	4 Высота орбиты		No-7 Но-7 но-7 орби- ты, км
			5 в аперге, км	6 в пери- геа, км	
9 января 9	«Космос-1616»	89,8	381	188	64,9
15 января	«Космос-1617»	114	1438	1488	82,8
16 января	«Космос-1622»	98,4	405	218	79
16 января	«Молния-3»	12 ч 31 18 мин 20	40 883	840	82,9
17 января	«Космос-1624»	100,8	825	787	74
18 января	«Горизонт»	23 ч 21 мин	Великий и стаци- нарный спутники		1,8
23 января	«Космос-1628»	89,7	411	114	68
24 января	«Космос-1629»	87,7	677	643	62,8
1 февраля	«Космос-1627»	104,9	1631	877	82,9
6 февраля	«Космос-1628»	88,3	487	288	72,8
7 февраля	«Молния-3»	104	878	888	82,8
21 февраля	«Космос-1629»	24 ч 12 мин	38 187		1,3
27 февраля	«Космос-1630»	89,8	387	182	64,9
27 февраля	«Космос-1631»	89,8	817	474	62,9
1 марта	«Космос-1632»	88,8	381	283	72,9
8 марта	«Космос-1633»	87,7	671	641	62,8
14 марта	«Космос-1634»	104,7	1634	876	82,9
21 марта	«Космос-1635»	118	1838	1488	74
22 марта	«Экран»	23 ч 48 мин	38 888		6,4
23 марта	«Космос-1642»	89,1	389	190	64,9
3 апреля	«Космос-1644»	89,4	388	217	79,4
10 апреля	«Космос-1645»	89,8	411	223	62,8
19 апреля	«Космос-1646»	82,3	488	422	68
19 апреля	«Космос-1647»	88,4	348	188	67,1
25 апреля	«Космос-1648»	88,8	283	188	62,8
26 апреля	«Прогноз-1»	24 ч 28 мин	388 888	488	68
	«Интеркосмос»				

[Text] Kosmos is the designation of a series of satellites which are launched on a regular basis (since 18 March 1962), with various types of boosters, from space launch facilities in the Soviet Union. The scientific research program prescribes the following: study of concentration of charged particles in the ionosphere (for the purpose of investigating radio-wave propagation), corpuscular fluxes and low-energy particles, the energy composition of the Earth's radiation belts, for the purpose of evaluating radiation hazard during extended missions, the primary composition of cosmic rays and variations in their intensity, the Earth's magnetic field, shortwave emissions by the Sun and other bodies, the upper atmosphere, the effect of meteoritic matter on space vehicle structural components; development of space navigation system components (designed to determine the position of Soviet civil aircraft, merchant and fishing vessels), experimental equipment designed for a system to

18 мая	13	«Космос-1600»	00.2	300	200	72.9
18 мая		«Космос-1600»	11 ч	10 127	64.8	
22 мая		«Космос-1602»	00.6	222	222	82.9
23 мая		«Космос-1603»	00.7	303	181	64.9
29 мая		«Молния-3»	12 ч	40 851	485	82.8
30 мая		«Космос-1605»	100.1	1030	900	82.9
30 мая		«Космос-1606»	101.6	864	811	71.1
6 июня	14	«Сонет Т-13»	00.03	230	203	81.6
7 июня		«Космос-1607»	00.3	313	195	82.3
11 июня		«Космос-1608»	11 ч	30 343	613	82.8
13 июня		«Космос-1609»	00.1	379	319	72.9
14 июня		«Космос-1610»	11.0	1530	1400	73.6
18 июня		«Космос-1601»	12 ч	40 164	612	82.8
19 июня		«Космос-1602»	00.0	821	479	82.9
31 июня		«Прогресс-36»	00.8	379	193	81.6
21 июня		«Космос-1603»	00.4	290	227	82.3
24 июня		«Космос-1604»	00.3	403	287	72.9
3 июля	5	«Космос-1605»	00.6	316	200	72.9
9 июля		«Космос-1606»	07.8	679	640	82.8
10 июля		«Космос-1607»	00	297	223	82.3
18 июля		«Космос-1608»	00.3	297	210	70.4
17 июля		«Молния-3»	12 ч	34 400 890	35 463	82.8
			10 мин	в Северном полушарии	в Южном полушарии	
18 июля	16	«Космос-1609»	00.8	284	193	81.6
1 августа		«Космос-1610»	00.8	278	233	80
2 августа		«Космос-1611»	00.3	310	219	72.6
7 августа		«Космос-1612»	00	299	199	82.3
8 августа		«Космос-1613»	00.3	294	204	64.8
8 августа		«Космос-1614»	07.8	677	640	82.8
9 августа		«Радуга» 29	24 ч	30 960	30 960	1.3
			30 мин			
12 августа		«Космос-1615»	11 ч	30 483	603	82.9
18 августа		«Космос-1616»	01 мин	371	170	67.3
22 августа		«Молния-1»	12 ч	40 630	636	82.8
			10 мин			
24 августа		«Космос-1617»	00.6	290	255	85
29 августа		«Космос-1618»	00.3	311	196	82.3
29 августа		«Космос-1619»	00.7	304	182	64.9
4 сентября	17	«Космос-1620»	100.8	822	797	74.1
6 сентября		«Космос-1621»	00	281	210	82.4
17 сентября		«Сонет Т-14» 30	00.6	340	200	81.6
19 сентября		«Космос-1622»	82.3	454	435	85
19 сентября		«Космос-1623»	00.3	399	200	72.9
24 сентября		«Космос-1624»	11 ч	30 343	613	82.8
26 сентября		«Космос-1625»	40 мин	379	209	72.9
27 сентября		«Космос-1626»	00.3	320	170	81.6
30 сентября		«Космос-1627»	11 ч	30 343	613	82.8
2 октября	18	«Космос-1628»	40 мин	336	347	80.7
5 октября		«Космос-1629»	82.4	663	574	90
7 октября		«Молния-3»	12 ч	40 605	644	82.9
			15 мин			
10 октября		«Космос-1630»	114	1430	1400	82.6
16 октября		«Космос-1631»	00.3	298	218	70.4
22 октября		«Космос-1632»	103	880	832	71
23 октября		«Космос-1633»	41 ч	30 343	613	82.8
			40 мин			
23 октября		«Молния-1»	11 ч	30 945	656	83
			40 мин			
24 октября		«Метеор-3»	110.3	1263	1235	82.5

determine the location of vessels and aircraft in distress; acquisition of current information and continuation of development of new types of telemetry and remote sensing equipment and remote-sensing methods of investigating the World Ocean and Earth's surface for the benefit of the branches and sectors of the USSR economy and science; development of experimental equipment for telegraph and telephone communications relay; investigation of the effect of space-flight factors on living organisms; study of the processes of adaptation to weightlessness and finding solution to the problems of radiation danger of space flight; investigation and acquisition on a regular basis of data on Earth resources for the benefit of various branches and sectors of the USSR economy and international cooperation; development of satellite equipment and structural components in various flight modes, including joint flight with Salyut station; continued development of new types of remote sensing equipment and methods of remote-sensing investigation of the Earth's surface and atmosphere.

Kosmos 1617 - Kosmos 1622 were launched into orbit by a single booster.

Molniya 3 is a communications satellite supporting operation of a long-distance telephone and telegraph communications system and transmission of USSR Central Television programming to Earth stations of the Orbita and international cooperation network.

Gorizont is a communications satellite. Launched as part of a program of further development of satellite communications and TV broadcasting systems. Launched into a close to stationary circular orbit.

Meteor 2 is a satellite for obtaining global images of cloud cover and

25 октября	«Космос-1699»	89,6	354	36	177	67,3
25 октября	«Космос-1700»	23 ч 31 мин	Круговая 35 760			1,4
28 октября	«Молния-1»	11 ч 42 мин	30 145	480		62,8
9 ноября	«Космос-1701»	11 ч 40 мин	30 342	613		62,8
13 ноября	«Космос-1702»	80,2	399	207		72,8
15 ноября	«Радуга»	24 ч 41 мин	Ближняя по стационарной круговой 30 655			1,3
23 ноября	«Космос-1703»	87,8	678	647		62,8
28 ноября	«Космос-1704»	105	1023	996		62,8
3 декабря	«Космос-1705»	80,1	307	208		72,8
11 декабря	«Космос-1706»	80,6	399,8	177,9		67,2
12 декабря	«Космос-1707»	87,8	678	656		62,8
13 декабря	«Космос-1708»	80,2	313	196		62,8
19 декабря	«Космос-1709»	104,9	1026	982		62,8
24 декабря	«Молния-3»	12 ч 16 мин	40 793	477		62,8
25 декабря	«Космос-1710» — «Космос-1712»	11 ч 17 мин	Круговая 19 160		36	65
26 декабря	«Метеор-2»	104	875	952		62,8
27 декабря	«Космос-1713»	80,7	419	224		62,8
28 декабря	«Космос-1714»	84,8	863	190		71

- Key: 1. Date of launch;
2. Designation of vehicle;
3. Initial orbital period, min;
4. Altitude of orbit;
5. At apogee, km;
6. At perigee, km;
7. Orbital inclination, degrees;
8. Purpose of vehicle;
9. January;
10. February;
11. March;
12. April;
13. May;
14. June;
15. July;
16. August;
17. September;
18. October;
19. November;
20. December;
21. Kosmos;
22. Molniya;
23. Gorizont;
24. Meteor;
25. Ekran;
26. Prognoz 10-Interkosmos

underlying surface in the visible and infrared regions of the spectrum, both in delayed and direct-transmission mode, as well as for continuous observations of fluxes of penetrating radiation in near-Earth space.

Kosmos 1635 - Kosmos 1642 satellites were launched into orbit by a single booster.

Ekran is a TV broadcast satellite carrying relay equipment which provides transmission of Central Television programming in the 10-centimeter band to a network of shared Earth station receiving facilities. Launched into a near-stationary circular orbit. The Ekran and Moskva systems, operating via a high-powered relay transmitter on the Gorizont satellite, in the 1-centimeter band, open up prospects for total coverage of the USSR by Central TV broadcasting.

Prognoz 10 - Interkosmos is an unmanned probe tasked with investigating the structure of interplanetary and near-Earth shockwaves generated by the interaction of the solar wind with the Earth's magnetosphere. It carries scientific equipment designed by Soviet and Czechoslovak Scientists and specialists within the Interkosmos program (project Intershok). Twenty-third orbital vehicle of the Interkosmos series. Soviet and Czechoslovak scientists dedicated this launch to the 40th anniversary of the Great Victory.

Kosmos 1650 - Kosmos 1652 satellites were launched into orbit by a single booster.

The Soyuz T-13 is a manned spacecraft, with a crew consisting of mission commander twice Hero of the Soviet Union Pilot-Cosmonaut USSR V. Dzhanibekov and flight engineer Hero

- | | |
|---------------------------------|--|
| 27. Soyuz T-13; | of the Soviet Union Pilot-Cosmonaut |
| 28. Progress; | USSR V. Savinykh. This is V. |
| 29. Raduga; | Dzhanibekov's fifth mission (6 June-26 |
| 30; Soyuz T-14 | September 1985; 112 days 3 hours 12 |
| 31. Hours; | minutes). First mission: 10-16 |
| 32. Minutes; | January 1978 on board the Soyuz 27 |
| 33. Near-stationary circular; | spacecraft & Salyut 6 station (5 days |
| 34. In the Northern Hemisphere; | 22 hours 59 minutes). Second: 22-30 |
| 35. In the Southern Hemisphere; | March 1981 on board the Soyuz 39 |
| 36. Circular | spacecraft and Salyut 6 station (7 |
| | days 20 hours 43 minutes). Third: 24 |

June-2 July 1982 on board the Soyuz T-6 spacecraft and Salyut 7 station (7 days 21 hours, 51 minutes). Fourth: 17-29 July 1984 on board the Soyuz T-12 spacecraft and Salyut 7 station (11 days 19 hours 14 minutes). This is V. Savinykh's second mission (6 June-21 November 1985; 168 days 3 hours 51 minutes). He flew his first mission on 12 March-26 May 1981 on board the Soyuz T-4 spacecraft and Salyut 6 station (74 days 18 hours 38 minutes). Docking with the Salyut 7 orbital station was accomplished on 8 June. The cosmonauts brought the station back into service.

On 26 September, upon completing the scheduled joint research and experiments with the crew of the Soyuz T-14 spacecraft, V. Dzhanibekov and G. Grechko returned to Earth on board the Soyuz T-13 spacecraft.

Progress 24 is an unmanned cargo transport. Purpose of launch -- delivery of various supplies to the orbital station, including crew life-support equipment, equipment for conducting scientific research, fuel for the propulsion unit, and equipment for station maintenance operations. Total weight of delivered supplies 2,000 kg. Automatic docking of the supply craft with the Salyut 7 - Soyuz T-13 manned orbital complex took place on 23 June. The craft undocked from the station and completed its mission on 15 July.

Raduga is a communications relay satellite tasked with telephone-telegraph radio communications and transmission of TV programming. Launched into a near-stationary circular orbit. The satellite carries multichannel communications equipment operating in the 1-centimeter band, as well as requisite ancillary systems.

Molniya 1 is a long-distance telephone-telegraph radio communications satellite, which also transmits USSR Central Television programming to Orbita network earth stations. It is in a highly-elongated elliptical orbit with an approximately 39,000 km apogee in the Northern Hemisphere and a 658 km perigee in the Southern Hemisphere. This orbit provides communications sessions running up to 8-10 hours in the Northern Hemisphere. The first Molniya 1 satellite was launched on 23 April 1965. Subsequent upgrading led to the development of the Molniya 2 and Molniya 3 satellites. In particular, they employ a higher frequency band (4-6 Gigahertz), which makes it possible to increase severalfold the number of telephone-telegraph communications channels. This also made it possible to improve TV image quality.

Soyuz T-14 is a manned spacecraft with a crew consisting of mission commander V. Vasyutin, flight engineer twice Hero of the Soviet Union G. Grechko, and

Cosmonaut-Scientist A. Volkov. This is G. Grechko's third mission (17-26 September 1985; 8 days 21 hours 13 minutes). He flew his first mission on 11 January-9 February 1975 on board the Soyuz 17 spacecraft and Salyut 4 station (29 days 13 hours 20 minutes). Second mission: 10 December 1977-16 March 1978 on board the Soyuz 26 spacecraft and Salyut 6 station (96 days 10 hours). On 18 September the spacecraft docked with the Salyut 7 - Soyuz T-13 orbital complex, manned by V. Dzhanibekov and V. Savinykh. Following an 8-day joint flight, V. Dzhanibekov and G. Grechko returned to Earth on board the Soyuz T-13 spacecraft. In conformity with the scheduled program, V. Vasyutin, V. Savinykh, and A. Volkov remained on board the station. This was the first partial crew relief, which makes possible continuous orbital complex operation over an extended period of time and considerably increases the efficiency of its utilization for the benefit of science and the economy. The cosmonauts returned to Earth on 21 November.

The Kosmos 1690 - Kosmos 1695 satellites were launched into orbit by a single booster.

The Kosmos 1669 satellite is similar to the Progress spacecraft. It carries equipment for the conduct of scientific investigations both during self-contained flight and as a component of an orbital complex. Automatic docking of the satellite with the Salyut 7 - Soyuz T-13 manned orbital complex took place on 21 July. The satellite docked to the station at the service bay docking position. The satellite was undocked from the station on 29 August.

Meteor 3 is a weather satellite intended to provide further improvement of the satellite weather system, including development of remote sensing equipment and methods of remote sensing of the Earth's atmosphere and surface for the benefit of the USSR economy and science.

The Kosmos 1686 satellite is similar in design to the Kosmos 1267 and Kosmos 1443 satellites, tests on which were conducted in 1981-1983 in various modes and in the course of joint flights with the Salyut 6 and Salyut 7 orbital stations. Automatic docking of the satellite with the Salyut 7-Soyuz T-14 manned orbital complex was accomplished on 2 October. The satellite docked to the station at the transfer bay position. It delivered to the station gear and equipment as well as various supplies required for further operation of the manned complex.

Kosmos 1710 - Kosmos 1712 satellites were launched into orbit by a single booster.

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